

START

0029336

Mr. John Grantham
State of Washington
Department of Ecology
Nuclear & Mixed Waste Program
P. O. Box 47600
Olympia, WA 98504-7600

FLUOR DANIEL, INC.

Date: May 19, 1992

Reference: Hanford Waste Vitrification Plant
DOE Contract DE-AC06-86RL10838
Fluor Contract 8457

Transmittal No.: WDOE-136

Dear Mr. Grantham:

TRANSMITTAL

We enclose * copy of the items listed below. These are issued per US-DOE request.
*5 FULLSIZE BLUELINES ROLLED & 1 REDUCED

Response due to Fluor: N/A

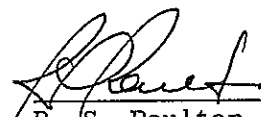
Responds to: A170 PACKAGE

NUMBER	Rev.	Date	TITLE
SEE TRANSMITTAL ATTACHMENT			A170 PACKAGE CONSTRUCTION POWER REFERENCE DOCUMENTS LIST

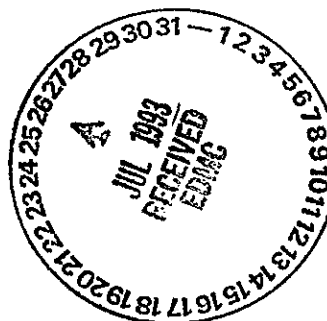
Distribution:

REFERENCE: FRP-415, FUP-143
R. L. Long: DOE-RL w/o
VPO/AME Corresp Cntrl Cntr, MSIN A5-10
(A170 PACKAGE), w/o
P. Felise, WHC-RL (MSIN G6-16), w/1f
Environmental Data Management Center
(MSIN H4-44), w/1f H4-22
D. Duncan, US EPA, Region X w/o

Very truly yours,


R. S. Poulter
Project Director


RSP:ERJ:lt



PACKAGE TRANSMITTAL ATTACHMENT

DRAWING NUMBER	SHT NO.	REV	DATE	DRAWING TITLE
H-2-122105	1	1	05/13/92	CONSTRUCTION POWER TITLE SHEET
H-2-122106	1	1	05/13/92	CONSTRUCTION POWER DRAWING INDEX
H-2-122107	1	1	05/13/92	ELECTRICAL GENERAL NOTES AND SYMBOLS
H-2-122108	1	1	05/13/92	ELECTRICAL STANDARD ASSEMBLIES AND DETAILS
H-2-122109	1	1	05/13/92	ELECTRICAL CONSTRUCTION POWER ONE-LINE DIAGRAM
H-2-122110	1	1	05/13/92	ELECTRICAL SITE DEMOLITION PLAN
H-2-122111	1	1	05/13/92	ELECTRICAL POLE LINE RELOCATION PLAN
H-2-122112	1	1	05/13/92	ELECTRICAL POLE LINE DETAILS
H-2-122112	2	1	05/13/92	ELECTRICAL POLE LINE DETAILS
H-2-122126	1	1	05/13/92	ELECTRICAL CONSTRUCTION UTILITIES OVERALL DISTRIBUTION PLAN
H-2-122134	1	1	05/13/92	ELECTRICAL CONSTRUCTION UTILITIES DETAILS
H-2-122134	2	1	05/13/92	ELECTRICAL CONSTRUCTION UTILITIES DETAILS
H-2-122134	3	1	05/13/92	ELECTRICAL CONSTRUCTION UTILITIES DETAILS
H-2-122135	1	0	05/13/92	ELECTRICAL POLE LINE PROFILE
H-2-122135	2	0	05/13/92	ELECTRICAL POLE LINE PROFILE
H-2-118060	1	1	05/13/92	STRUCTURAL NOTES AND TYPICAL DETAILS
H-2-118061	1	1	05/13/92	STRUCTURAL SG-32T-001 SWITCHGEAR FOUNDATION DETAILS
H-2-118062	1	1	05/13/92	STRUCTURAL ELECTRICAL EQUIPMENT FOUNDATION DETAILS
H-2-118063	1	1	05/13/92	STRUCTURAL TEL CONSOLE & LIGHT POLE FOUNDATION DETAILS

05/18/92

TRANSMITTAL ATTACHMENT FOR PACKAGE SPECIFICATIONS

SPEC NUMBER	REV	SPECIFICATION TITLE	SECT	SECTION TITLE
B-595-C-A170	1	CONSTRUCTION POWER	01730	OPERATION AND MAINTENANCE DATA
B-595-C-A170			02220	EXCAVATION AND BACKFILL
B-595-C-A170			03300	CONCRETE CONSTRUCTION
B-595-C-A170			16100	ELECTRICAL INSTALLATION
B-595-C-A170			16110	ELECTRICAL MATERIALS AND DEVICES
B-595-C-A170			16905	ELECTRICAL TESTING

97-315-16

REFERENCE DOCUMENTS LIST
A170 PACKAGE

<u>DOCUMENT NO.</u>	<u>DESCRIPTION</u>	<u>PACKAGE</u>
H-2-122055	ELECT. FENCE LIGHTING PLAN	A150
H-2-122083	ELECT. ONE-LINE DIAGRAM	A160

60-152
35-098
71

9413154-1079

SPECIFICATIONS

CONSTRUCTION POWER

B-595-C-A170

HANFORD WASTE VITRIFICATION PLANT

**U.S. DEPARTMENT OF ENERGY
RICHLAND OPERATIONS OFFICE**



**FLUOR DANIEL
ADVANCED TECHNOLOGY DIVISION
CONTRACT 8457**

**DOE CONTRACT NO.
DE-AC06-86RL10838**

CONSTRUCTION POWER
SPECIFICATION B-595-C-A170

"APPROVED FOR CONSTRUCTION"

REVISION NO. 1
SAFETY CLASS 4
ISSUE DATE

APPROVED BY:

ER Jacobs
E. R. Jacobs Project Package Engineer

4-28-92
Date

J L Smets
J. L. Smets Baseline Engineering Manager

4/28/92
Date

J L Smets
J. L. Smets Systems Engineering Manager

4/28/92
Date

A K Yee
A. K. Yee Independent Safety Manager

4/28/92
Date

J G Kelly
J. G. Kelly Q. A. Manager

4-28-92
Date

R S Poulter
R. S. Poulter Project Director

30 APR 92
Date

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CONSTRUCTION POWER
(B-595-C-A170)

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DIVISION 16 - ELECTRICAL

Section	Title
16100	Electrical Installation
16110	Electrical Materials and Devices
16905	Electrical Testing

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SECTION 03300 CONCRETE CONSTRUCTION

PART 1 GENERAL

1.1 SUMMARY

This section covers the technical requirements for the furnishing, installation, inspection and testing of cast-in-place concrete and reinforcing steel.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN CONCRETE INSTITUTE (ACI)

ACI 301	1989 Specification for Structural Concrete for Buildings
ACI 305R	1989 Hot Weather Concreting
ACI 306R	1988 Cold Weather Concreting
ACI SP-66	1988 ACI Detailing Manual

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A615	1990 Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM C31	1990 Standard Test Method for Making and Curing Concrete Test Specimens in the Field
ASTM C33	1990 Standard Specification for Concrete Aggregates
ASTM C39	1986 Standard Method of Test for Compressive Strength of Cylindrical Concrete Specimens
ASTM C94	1990 Standard Specification for Ready-Mixed Concrete

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ASTM C143	1990 Standard Test Method for Slump of Hydraulic Cement Concrete
ASTM C150	1989 Standard Specification for Portland Cement
ASTM C172	1990 Standard Practice for Sampling Freshly Mixed Concrete
ASTM C173	1978 Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
ASTM C260	1986 Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C494	1986 Standard Specification for Chemical Admixtures for Concrete

1.3 SUBMITTALS

Submit the following in accordance with the Vendor Drawing and Data Requirements section of the Order/Subcontract.

1.3.1 Cast-in-Place Concrete

1.3.1.1 Materials

Material test reports for all concrete materials and admixtures to demonstrate conformance to the specification requirements.

1.3.1.2 Mix Design

Concrete mix design to demonstrate conformance to the specification requirements.

1.3.1.3 Placement Schedule

Concrete placement schedule per Paragraph 3.2.3.2.

1.3.1.4 Jobsite Records

Jobsite records of placed concrete per Paragraph 3.2.3.7.

1.3.1.5 Test Reports

Reports of field tests as specified in Paragraph 3.3.2 for slump, air content and compression shall be by the Buyer.

1.3.2 Reinforcing Steel

Certified Mill Test Report documenting the conformance of the materials as specified in Paragraph 2.3.

PART 2 PRODUCTS

2.1 CAST-IN-PLACE CONCRETE

2.1.1 Cement: ASTM C150; Type I or Type II

2.1.2 Aggregates: ASTM C33; Maximum size of coarse aggregate shall be 1 inch unless noted otherwise on the Contract Drawings.

2.1.3 Water: Shall be clean and potable meeting the requirements of ASTM C94. In addition, the water shall not contain more than 250 ppm of chloride as Cl.

2.1.4 Admixtures if used shall conform to the following requirements:

2.1.4.1 Air Entrainment: ASTM C260; MB-VR manufactured by Master Builders, Inc. or equal.

2.1.4.2 Water Reducing: ASTM C494, Type A; Pozzolith 220-N manufactured by Master Builders, Inc. or equal.

2.1.5 Concrete Mix

2.1.5.1 Mix concrete in accordance with ACI 301, Chapter 7. Deliver concrete in accordance with ASTM C94.

2.1.5.2 Select proportions for normal weight concrete in accordance with ACI 301, Chapter 3.

2.1.5.3 Concrete shall conform to the following requirements:

Compressive Strength (28 days): 4,000 psi, minimum
W/C Ratio: W/C ratio not to exceed 0.5
Slump: 2 to 4 inches
Air Entrainment: As required per mix design, not to exceed 4 percent

2.1.5.4 Use accelerating admixtures in cold weather only when approved by the Buyer. Use of admixtures will not relax cold weather placement requirements.

2.1.5.5 Use of calcium chloride is not permitted.

- 2.1.5.6 Use set retarding admixtures during hot weather only when approved by the Buyer.
- 2.1.5.7 Admixtures used in the work shall be of the same composition as those used in establishing the concrete properties.
- 2.1.5.8 Storage of materials shall be per Section 2.5 of ACI 301.

2.2 CONCRETE FOR DIRECT BURIAL CABLE

Concrete protection for direct burial cable shall be 4" thick cast-in-place concrete as shown on the Contract Drawings and shall comply with the requirements specified above for cast-in-place concrete except as noted below.

Compressive Strength (28 days): 2500 psi, minimum
Maximum Aggregate Size: 3/8 inch
Cement per cubic yard of concrete: 4 sacks, minimum

The top surface of all cable protective concrete shall be colored red. The color may be applied by sprinkling red iron oxide powder over freshly poured concrete at the rate of 0.1 pounds per square foot of concrete surface, or by painting the surface after concrete has hardened and cured.

2.3 REINFORCING STEEL

ASTM A615, 60 ksi yield grade; deformed billet steel bars, plain finish.

2.4 CONCRETE ACCESSORIES

- 2.4.1 All accessories and devices associated with the installation of concrete construction shall be supplied in accordance with this specification and the requirements shown on the Contract Drawings.
- 2.4.2 Tie Wire: Minimum 16 gauge, black, annealed type.
- 2.4.3 Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement.
- 2.4.4 Special Chairs, Bolsters, Bar Supports, Spacers adjacent to Weather Exposed Concrete Surfaces: Plastic coated steel type; size and shape as required.

2.5 FABRICATION AND MANUFACTURE

- 2.5.1 Fabricate reinforcing steel in accordance with ACI SP-66 and to the dimensions shown on the Contract Drawings.

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- 2.5.2 Bend bars cold in a manner that will not injure the material.
- 2.5.3 Store reinforcing steel off the ground and protect from oil or other deleterious materials.
- 2.5.4 Rust, seams, surface irregularities, or mill scale shall not be cause for rejection, provided the weight and height of deformations of a hand-wired-brush test specimen are not less than that specified by ASTM A615.
- 2.5.5 Tag bundles of reinforcing bars showing quantity, grade, size, and suitable identification to allow checking, sorting and placing.

PART 3 EXECUTION

3.1 PREPARATION

- 3.1.1 Prior to concrete placement, verify that the concrete cover is as shown on the Contract Drawings. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, securely positioned as shown on the Contract Drawings.
- 3.1.2 Construction joints shall be prepared in accordance with ACI 301, Section 6.1 and Section 8.5.3.
- 3.1.3 Remove laitance and concrete splatter from protruding reinforcing steel after each concrete placement.
- 3.1.4 Continue all reinforcement across construction joints. Do not use longitudinal keys and inclined dowels.
- 3.1.5 All equipment for mixing and transporting concrete shall be clean.
- 3.1.6 All debris and ice shall be removed from spaces to be occupied by concrete.
- 3.1.7 Forms shall be properly coated in accordance with Section 4.4 of ACI 301.
- 3.1.8 Reinforcement shall be thoroughly clean of ice, earth, loose rust and mill scale or other deleterious coatings.
- 3.1.9 Standing water shall be removed from place of deposit before concrete is placed.
- 3.1.10 All laitance and other unsound material shall be removed before additional concrete is placed against hardened concrete.

3.2 INSTALLATION, APPLICATION AND ERECTION

3.2.1 Formwork

Formwork design, installation and removal shall be in accordance with ACI 301, Chapter 4. Form exposed corners of structures and foundations with a one inch chamfer unless noted otherwise on the Contract Drawings.

3.2.2 Placing Reinforcement

3.2.2.1 Place, support and secure all reinforcement to prevent displacement from its required position. Reinforcement placing tolerances shall meet the requirements of ACI 301 Chapter 5. Bars shall be tied securely to prevent displacement and all dowels shall be securely held in place prior to depositing concrete.

3.2.2.2 When necessary to move reinforcing bars to avoid interference with other reinforcement, conduits, or embedded items exceeding the specified placing tolerances, the resulting arrangement of bars shall be subject to acceptance by the Buyer.

3.2.3 Placing Concrete

3.2.3.1 Place concrete in accordance with ACI 301, Chapter 8, except as modified by the supplemental requirements herein.

3.2.3.2 Prepare concrete placement schedule for each concrete pour for Buyer's approval. The schedule should address the following items:

- A. Pour number;
- B. Extent of pour, plan and elevation views;
- C. Volume of concrete;
- D. Reference to applicable submitted concrete mix design.

3.2.3.3 Do not use equipment made of aluminum alloys for pump lines, tremies, or chutes used to discharge concrete from a truck mixer.

3.2.3.4 Concrete shall not be cast against any frozen surface.

3.2.3.5 When the ambient temperature is below 40°F or expected to be below 40°F within 24 hours of concrete placement, the provisions of ACI 306R shall be followed.

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3.2.3.6 When the ambient temperature is above 90°F or expected to be above 90°F at time of concrete placement, the provisions of ACI 305R shall be followed.

3.2.3.7 Maintain a jobsite record of placed concrete. Record date, time, location, quantity, air temperature, concrete temperature, delivery slip number, cylinder sample numbers and pour number.

3.2.4 Concrete Finishing

3.2.4.1 Finish formed surfaces in accordance with ACI 301, Chapter 10, except as modified by the supplemental requirements herein.

3.2.4.2 Formed surfaces not exposed to earth shall have a "smooth form finish."

3.2.4.3 Formed surfaces exposed to earth may have a "rough form finish."

3.2.4.4 Slabs shall have a "broom finish" and maintaining surface flatness within 1/4 inch in 10 feet as determined by a 10 foot straight edge placed anywhere on the slab in any direction.

3.2.5 Curing and Protection

Cure and protect concrete in accordance with ACI 301, Chapter 12.

3.2.6 Repair of Surface Defects

Repair of surface defects shall be performed only with the approval of the Buyer and shall be performed in accordance with ACI 301, Chapter 9.

3.3 FIELD QUALITY CONTROL

3.3.1 General

3.3.1.1 The Buyer shall be responsible for the field testing of concrete to determine the work is performed in conformance to this specification and drawings.

3.3.1.2 Prior to the placement of any cast-in-place concrete the Seller shall meet with the Buyer and a representative from the testing agency designated by the Buyer. A procedure shall be developed for the gathering, handling and transporting of the required samples by the testing agency and for the submittal of the test results to the Buyer.

3.3.1.3 The responsibilities and duties of the Seller are as defined in ACI 301, Section 16.7.

- 3.3.2 Testing
- 3.3.2.1 Sampling and testing of concrete shall be in accordance with ACI 301, Chapter 16, except as modified by the supplemental requirements herein.
- 3.3.2.2 Concrete test samples shall be taken at or near the point of final deposit.
- 3.3.2.3 Concrete slump tests shall meet the requirements of ASTM C143. Perform a slump test concurrently with the preparation of molded test cylinders.
- 3.3.2.4 Concrete air content tests shall meet the requirements of ASTM C173. Perform air content tests concurrently with the preparation of molded test cylinders.
- 3.3.2.5 Molded cylinders for compression tests shall be prepared in sets of three meeting the requirements of ASTM C31. Composite samples shall be secured in accordance with ASTM C172. Each sample shall be obtained from a different batch of concrete on a random basis. Curing shall meet the requirements of ASTM C31 for the standard 7 day and 28 day tests.
- 3.3.2.6 The minimum sampling frequency shall be one set for each 100 cubic yards, or fraction thereof, per day for each mix design.
- 3.3.2.7 Compression testing of cylinders shall meet the requirements of ASTM C39. Test each set of three cylinders as follows:
- A. One cylinder at 7 days.
 - B. The remaining two cylinders at 28 days.
 - C. The acceptance test results shall be the average of the two specimens tested at 28 days per ACI 301, Paragraph 16.3.4.3.
- 3.3.3 Inspection
- 3.3.3.1 The inspection of reinforcing bar placement, concrete cover, formwork preparation and position of embedded items for compliance with the Contract Drawings shall be done prior to the placement of the concrete.
- 3.3.3.2 The concrete shall be inspected immediately upon the removal of the forms for excessive honeycombs or embedded debris. Repair of surface defects shall be performed in accordance with ACI 301, Chapter 9.

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3.3.4 Evaluation and Acceptance

The evaluation and acceptance of the concrete work shall meet the requirements of ACI 301, Chapters 17 and 18.

END OF SECTION

SECTION 16100 ELECTRICAL INSTALLATION

PART 1 GENERAL

1.1 SUMMARY

- 1.1.1 This specification section and the Contract drawings shall govern the installation of the electrical systems on the project. In case of conflict with this specification and the Contract Drawings, the specification shall govern. They are intended to identify all materials and equipment required to assemble the facilities. Any deviation from this specification and/or Contract Drawings must be authorized in advance by the Buyer.
- 1.1.2 Furnish all labor, material, tools and equipment necessary to perform installation of electrical site utilities as shown on the Contract Drawings and in accordance with the requirements of this specification.
- 1.1.3 Seller shall be responsible for field routing and/or matching of equipment wiring and conduit to components where not specifically defined on the Contract Drawings.
- 1.1.4 The project includes the installation of the following:
- 1.1.4.1 Lighting for temporary and permanent parking lots and roadways.
- 1.1.4.2 Construction power system including rerouting of existing 13.8 kV and 2.4 kV overhead distribution lines, 13.8 kV switchgear, 13,800-480/277V transformers, 480-208/120V transformers, 480/277V distribution switchboards and associated conduits, cable and materials.
- 1.1.4.3 Telephone interface cabinet for construction telephone service.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI C2 1990 National Electrical Safety Code

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 1990 National Electrical Code (NEC)

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1.3 RELATED REQUIREMENTS

Specification Section 16110 Electrical Materials and Devices

Specification Section 16905 Electrical Testing

1.4 SUBMITTALS

1.4.1 Submit the following in accordance with the Vendor Drawing and Data Requirements section of the Order/Subcontract.

1.4.2 Manufacturer's instructions for installation of 480/277V distribution switchboards, poles, luminaires and any other miscellaneous items identified in this specification and as shown on the Contract Drawings. Manufacturer's instructions shall include connection diagrams and any additional procedures for equipment storage, handling, protection, examination, preparation and start-up.

1.4.3 Sag and tension data obtained during the installation of overhead cable.

1.5 PROJECT OR SITE ENVIRONMENTAL CONDITIONS

1.5.1 Climatic and Geographic Site Conditions

A. Site Elevation 714 feet above sea level

B. Barometric Pressure 14.3 psia

C. Outside Design Temperature

1) Maximum Design Temperature 110°F

2) Minimum Design Temperature -20°F

1.5.2 Operating Environment

A. Normal Temperature -20° to 110°F

PART 2 PRODUCTS

2.1 MATERIALS AND/OR EQUIPMENT

Furnish all materials and equipment required to perform installation work in accordance with the Contract Drawings and Specification Section 16110.

PART 3 EXECUTION

3.1 INSTALLATION, APPLICATION AND ERECTION

- 3.1.1 Equipment and materials shall be installed in accordance with NFPA 70 and ANSI C2. Installation shall conform with the Contract Drawings and manufacturer's instructions furnished with equipment and materials.
- 3.1.2 Fastenings
- 3.1.2.1 Unless noted otherwise on the Contract Drawings, fastenings to steel shall be by means of machine screws, bolts or certified and approved welding method. No wood or fiber plugs shall be permitted.
- 3.1.2.2 Seller shall drill, tap, or weld to structural steel as required to mount equipment and material using an approved or specified method.
- 3.1.2.3 Seller shall supply and install electrical supports as shown on the Contract Drawings.
- 3.1.3 Grounding
- 3.1.3.1 The grounding of electrical equipment, personnel operated equipment and grounded electrical circuits shall be in accordance with the Contract Drawings. In addition to the grounding specified herein or on the Contract Drawings, all ground connections required by the National Electrical Code shall be furnished and installed. Where grounding conductor sizes are not indicated on the Contract Drawings, the minimum requirements of the National Electrical Code shall apply.
- 3.1.3.2 Before connections are made, all contact surfaces shall be clean of grease, dirt and debris.
- 3.1.3.3 All ground connections shall be exothermic welds as shown on the Contract Drawings.
- 3.1.3.4 The grounding of the 480-208/120V pad mounted transformers shall be similar to the 13,800-480/277V transformer and switchboard assembly as detailed on the Contract Drawings. The grounding shall consist of a 5/8 inch steel ground loop, two (2) ground rods located at opposing corners, and one (1) 5/8 inch steel tap from the loop to the equipment enclosure. In addition, the circuit ground shall be connected to the equipment enclosures.

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3.1.4 Power Transformers

3.1.4.1 Power transformers shall be installed in accordance with manufacturer's instructions and as shown on the Contract Drawings. The following additional precautions shall be taken:

3.1.4.1.1 Inspect for external damage and to assure that the no-load tap changer is in position.

3.1.4.2 The 480-208/120V pad mounted transformers for the start-up trailers shall be field located.

3.1.5 Switchgear and Switchboards

3.1.5.1 Switchgear and switchboards shall be installed in accordance with manufacturer's instructions. The following additional precautions shall be taken:

3.1.5.1.1 Store indoors in a clean, dry place with a moderate temperature and cover with plastic tarp. Install and activate space heaters inside units. Space heaters shall be kept energized or thermostatically controlled to temperatures above the dew point while in storage and after installation.

3.1.5.1.2 Torque all bus bolts to manufacturer's recommendations.

3.1.6 Lighting System

3.1.6.1 Wire smaller than No. 12 AWG shall not be used for any lighting branch circuits.

3.1.6.2 Lighting fixtures shall be installed at locations as shown on the Contract Drawings.

3.1.6.3 Route lighting circuits underground with direct buried cable. Cable shall be protected with 1 by 8 inch wood boards as shown on the Contract Drawings. Boards shall be treated with an approved factory applied preservative.

3.1.6.4 Install marking tape within backfill above wood board(s) as shown on the Contract Drawings.

3.1.6.5 Light poles shall be installed plumb. Use shims or double nuts to adjust plumb. Grout around each light pole base as shown on the Contract Drawings.

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3.1.7 Medium Voltage

3.1.7.1 Medium voltage cable shall be spliced and terminated in accordance with the recommendations of the manufacturer of the cable. Splices shall be made in manholes, pull boxes, handholes or junction boxes as shown on the Contract Drawings.

3.1.7.2 Direct burial cable shall be protected by 4 inch thick concrete, as shown on the Contract Drawings and Section 03300.

3.1.7.3 Medium voltage termination kits shall be installed in accordance with manufacturer's recommendations.

3.1.7.4 Plastic marking tape shall be placed in the backfill directly above the direct burial cable approximately 12 inches below grade as shown on the Contract Drawings.

3.1.8 Overhead Cables

3.1.8.1 Overhead cable shall be spliced and terminated in accordance with the recommendations of the manufacturer of the cable.

3.1.9 Poles

3.1.9.1 Steel Poles

3.1.9.1.1 Steel poles shall be installed in accordance with the recommendations of manufacturer and as shown on the Contract Drawings.

3.1.9.2 Wood Poles

3.1.9.2.1 Wood poles shall be installed in accordance with the recommendations of manufacturer and as shown on the Contract Drawings.

3.1.9.2.2 The minimum setting depth for poles shall be according to the following:

POLE LENGTH FEET	SETTING DEPTH
45	6'-6"
40	6'-0"

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3.1.10 Overhead Distribution

3.1.10.1 Guys and Anchors

3.1.10.1.1 Guys shall be placed before the conductors are strung and shall be attached to the pole as shown on the Contract Drawings.

3.1.10.1.2 All anchors and rods shall be in line with the strain and shall be installed as shown on the Contract Drawings.

3.1.10.2 Splices and Dead-Ends

Conductors shall be spliced and dead-ended as shown on the Contract Drawings. There shall be not more than one splice per conductor in any span and splicing sleeves shall be located at least ten feet from the conductor support.

3.1.10.3 Taps and Jumpers

Jumpers and other leads connected to line conductors shall have sufficient slack to allow free movement of the conductors.

3.1.10.4 Sag and Tension

Overhead conductors shall be installed in accordance with the Contract Drawings, Attachment A and manufacturer's sag and tension data. Ensure final sag applied is within tolerances of plus 3 inches to minus 0 inches. The sag shall be adjusted per manufacturer's sag tables for the temperature at the time of installation. Buyer shall be notified before final adjustments to the sag are made.

3.1.10.4.1 Record and supply to the Buyer the details of the sagging process giving the following details:

Length of section
Actual span of section
Date of sagging
Temperature at time of sagging
and either
Actual sag of conductors
Actual spans used in sagging
Or
Wire tension

3.1.10.5 Crossarms

Crossarms shall be installed in accordance with Contract Drawings.

3.1.10.6 Miscellaneous Hardware

Miscellaneous hardware for the overhead distribution, such as surge arresters and fused interrupter switches shall be installed in accordance with the manufacturer's installation instructions.

3.1.10.7 Underground Cable Marker

Install underground cable marker with arrow parallel to and facing underground run. Arrows shall point from the source to the point of utilization. Markers shall be placed one foot from the edge of the underground run and placed at 150 foot intervals on straight runs. At each turning point or tee, one marker shall be placed for each direction the cable or duct takes at that point.

3.1.11 Painting

3.1.11.1 Electrical equipment that may have been abraded during installation shall be touched up. Touch-up paint for switchgear and power transformers shall be supplied by the Buyer. Touch-up paint for switchboards shall be supplied by the Seller.

3.1.12 Open conduit ends shall have bushings unless other terminations are shown on the Contract Drawings. Sealant shall be used as required.

3.2 FIELD QUALITY CONTROL

Electrical materials and equipment shall be inspected and tested in accordance with Specification Section 16905, Electrical Testing.

END OF SECTION

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ATTACHMENT A
SAG AND TENSION DATA

CONDUCTOR: #2 AWG 7/1 STRANDING, SPARATE

SPAN (FT)	TEMP (F)	WIND (PSF)	ICE (IN)	INITIAL		FINAL	
				SAG (FT)	TENSION (LB)	SAG (FT)	TENSION (LB)
100	15	4	1/4	.61	1232	.61	1232
	60	0	0	.15	910	.17	794
	120	0	0	.27	492	.40	337
150	15	4	1/4	1.30	1289	1.30	1289
	60	0	0	.33	910	.39	774
	120	0	0	.60	504	.87	347
200	16	4	1/4	2.20	1354	2.20	1354
	60	0	0	.59	910	.71	750
	120	0	0	1.03	519	1.49	359
250	15	4	1/4	3.28	1422	3.28	1422
	60	0	0	.92	910	1.15	726
	120	0	0	1.56	535	2.24	372
300	15	4	1/4	4.51	1491	4.51	1491
	60	0	0	1.32	910	1.71	702
	120	0	0	2.18	552	3.12	384

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ATTACHMENT A
SAG AND TENSION DATA

CONDUCTOR: #4 AWG 6/1 STRANDING, SWAN

SPAN (FT)	TEMP (F)	WIND (PSF)	ICE (IN)	INITIAL		FINAL	
				SAG (FT)	TENSION (LB)	SAG (FT)	TENSION (LB)
100	15	4	1/4	.99	669	.99	669
	60	0	0	.15	465	.20	354
	120	0	0	.27	269	.51	141
150	15	4	1/4	2.04	729	2.04	729
	60	0	0	.35	465	.50	322
	120	0	0	.59	274	1.09	148
200	16	4	1/4	3.34	792	3.34	792
	60	0	0	.62	465	.99	291
	120	0	0	1.02	280	1.85	155
250	15	4	1/4	4.85	853	4.85	853
	60	0	0	.96	465	1.70	264
	120	0	0	1.56	287	2.74	163
300	15	4	1/4	6.54	911	6.54	911
	60	0	0	1.39	465	2.64	245
	120	0	0	2.19	294	3.77	171

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ATTACHMENT A
SAG AND TENSION DATA

CONDUCTOR: 336.4KCMIL 30/7 STRANDING, ORIOLE

SPAN (FT)	TEMP (F)	WIND (PSF)	ICE (IN)	INITIAL		FINAL	
				SAG (FT)	TENSION (LB)	SAG (FT)	TENSION (LB)
100	15	4	1/4	.26	5492	.26	5492
	60	0	0	.15	4325	.17	3814
	120	0	0	.24	2745	.35	1882
150	15	4	1/4	.58	5530	.58	5530
	60	0	0	.34	4325	.39	3809
	120	0	0	.53	2777	.77	1930
200	16	4	1/4	1.01	5579	1.01	5579
	60	0	0	.61	4325	.69	3802
	120	0	0	.94	2818	1.33	1989
250	15	4	1/4	1.57	5640	1.57	5640
	60	0	0	.95	4325	1.08	3796
	120	0	0	1.44	2865	2.01	2054
300	15	4	1/4	2.23	5708	2.23	5708
	60	0	0	1.37	4325	1.56	3790
	120	0	0	2.03	2916	2.75	2157

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ASTM B232 1986 Standard Specification for
Concentric-Lay-Stranded Aluminum
Conductors, Coated-Steel Reinforced
(ACSR)

ASTM B498 1988 Standard Specification for Zinc-
Coated (Galvanized) Steel Core Wire for
aluminum Conductors, Steel Reinforced
(ACSR)

ASTM F1135 1988 Standard Specification for Cadmium
or Zinc Chromate Organic Corrosion
Protective Coating for Fasteners

AMERICAN WOOD-PRESERVERS ASSOCIATION (AWPA)

AWPA C7 1990 Incised (Red, White and Yellow
Cedar) Pole Butts, Thermal Treatment

ASSOCIATION OF EDISON ILLUMINATING COMPANIES (AEIC)

AEIC CS6 1987 Specification for Ethylene Propylene
Rubber Insulated Shielded Power Cables
Rated 5 through 69 kV

FEDERAL SPECIFICATIONS (FS)

FS TT-P-645B 1990 Primer, Paint, Zinc-Molybdate, Alkyd
Type

FEDERAL STANDARDS (FS)

FS-595B 1989 Colors Used in Government
Procurement

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC. (IEEE)

IEEE 48 1990 Standard for High Voltage AC Cable
Terminations Test Procedures and
Requirements

IEEE 404 1986 Standard for Cable Joints for use
with Extruded Dielectric Cable Rated
5000V through 46,000V and Cable Joints
for use with Laminated Dielectric Cable
Rated 2500V through 500,000V

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ANSI/IEEE C37.20.2	1987 Metal-Clad and Station-Type Cubicle Switchgear, Standard for
ANSI/IEEE C62.11	1987 Metal-Oxide Surge Arresters for AC Power Circuits, Standard for
ANSI C78.41	1987 Electric Lamps - Low Pressure Sodium Lamps
ANSI C82.9	1988 High Intensity Discharge and Low Pressure Sodium Lamps, Ballasts, and Transformers - Definitions
ANSI C119.1	1986 Electric Connectors - Sealed Insulated Underground Connector Systems Rated 600 Volts

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A36	1989 Standard Specification for Structural Steel
ASTM A153	1982 (R 1987) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A307	1990 Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength
ASTM A475	1989 Standard Specification for Zinc Coated Steel Wire Strand
ASTM A500	1989 Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM B3	1990 Standard Specification for Soft or Annealed Copper Wire
ASTM B8	1986 Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
ASTM B230	1989 Standard Specification for Aluminum 1350-H19 Wire for Electrical Purposes

NATIONAL ELECTRIC MANUFACTURERS ASSOCIATION (NEMA)

NEMA LA1	1986 Surge Arresters
NEMA PB2	1989 Dead-Front Distribution Switchboards
NEMA RN1	1986 Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit
NEMA WC7	1988 Cross-Linked-Thermosetting-Polyethylene-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy
NEMA WC8	1988 Ethylene-Propylene-Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	1990 National Electrical Code (NEC)
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UNDERWRITER'S LABORATORIES (UL)

UL 44	1983 Rubber Insulated Wires and Cables, Twelfth Edition
UL 198G	1988 Standard for Fuses for Supplementary Overcurrent Protection
UL 467	1984 Grounding and Bonding Equipment
UL 510	1986 Insulating Tape, Sixth Edition
UL 651	1989 Schedule 40 and 80 Rigid PVC Conduit, Fifth Edition
UL 891	1984 Dead-Front Switchboards
UL 1072	1986 Medium Voltage Power Cables
UL 1277	1989 List of Acceptable Sunlight-Resistant PVC Compounds for use as Insulating and/or Jacketing Material on Listed Outdoor Flexible Cords and Christmas-Tree Wire and Cords, Medium-Voltage Cable, Power and Control Tray Cable, and Metal Clad Cable

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- UL 1449 1985 Transient Voltage Surge Suppressors
- UL 1581 1983 Reference Standard for Electrical Wires, Cables and Flexible Cords

1.3 RELATED REQUIREMENTS

- Specification Section 01730 Operation and Maintenance Data
- Specification Section 16100 Electrical Installation
- Specification Section 16905 Electrical Testing

1.4 SUBMITTALS

Submit the following in accordance with the Vendor Drawing and Data Requirements section of the Order/Subcontract.

1.4.1 Manufacturer's Catalog Data including the following:

- A. Splice Kit
- B. PVC Conduit
- C. Sealant
- D. Fused Interrupter Switches
- E. Insulating Tape
- F. Marking Tape
- G. Wood Boards
- H. Ground Conductors
- I. Ground Rods
- J. Grounding Assembly
- K. Ground Connectors
- L. Anti-Oxidizing Compound
- M. Exothermic Welds
- N. Surge Arresters
- O. Cable Termination Kits

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- P. Cable to Bus Connection Kits
- Q. Wood Poles
- R. 5 kV Crossarm Pin Insulator Assembly
- S. 5 kV Dead-End Assembly
- T. 15 kV Dead-End Insulator Assembly
- U. Double Crossarm Assembly for Dead-End Loading
- V. Down Guy Assembly
- W. Horizontal Guy Assembly
- X. Miscellaneous Pole Line Devices
- Y. Exterior Lighting Assembly
- Z. 600 Volt Power Cable
- AA. Medium Voltage Cable
- AB. Concrete Boxes
- AC. Concrete Box Covers
- AD. Concrete Cone Anchors
- AE. Underground Cable Markers
- AF. Hardware
- AG. PVC Coated Rigid Steel Galvanized
- AH. Guy Wire

1.4.2 Shop Drawings

1.4.2.1 Switchboard

Submit switchboard detailed shop drawings indicating outline dimensions, enclosure construction, shipping splits, lifting and supporting points, schematic single line diagrams, elementary and detailed connection diagrams and equipment electrical rating.

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Also provide approximate position of overall vertical and horizontal center of gravity for unit, size and location of anchor bolts, hold down and/or base frame details and the shipping and operating weights.

1.4.2.2 Exterior Lighting Assembly

1.4.2.2.1 Luminaries

Include dimensions, effective projected area (EPA), accessories, and installation and construction details. Photometric data, including zonal lumen data, and candlepower distribution data.

1.4.2.2.2 Poles

Include dimensions, wind load withstand capability and maximum pole deflection under maximum loading conditions in accordance with AASHTO LTS2.

1.4.2.2.3 Anchor base and anchor bolt pattern details and criteria.

1.4.2.3 Power Cables

Submit detailed shop drawings indicating outline dimensions and assembly for the ACSR cable, enclosure construction, insulation and assembly for the direct burial cable.

1.4.2.3.1 Sag and Tension Data

Submit manufacturer's data for stringing sags and tensions. Span range shall be 100 to 350 feet at 50 foot intervals. Temperature range shall be -20°F to 110°F at 10° intervals.

1.4.3 Manufacturer's Installation Instructions for the following:

1.4.3.1 Switchboards

1.4.3.2 Fused Interrupter Switches

1.4.3.3 Surge Arresters

1.4.4 Test Reports

1.4.4.1 Power Cable

Submit Factory Certified Test Reports on 5 kV and 15 kV direct burial power cables and overhead conductors of bare aluminum conductor steel reinforced (ACSR) after performing factory acceptance tests in accordance with AEIC CS6 and ASTM B498 respectively as indicated in Paragraph 2.2.1.

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1.4.5 Operation and maintenance data in accordance with Specification Section 01730, Operation and Maintenance Data.

1.5 PROJECT OR SITE ENVIRONMENTAL CONDITIONS

1.5.1 Climatic and Geographic Site Conditions

A. Site Elevation 714 feet above sea level

B. Barometric Pressure 14.3 psia

C. Outside Design Temperature

1) Maximum Design Temperature 110°F

2) Minimum Design Temperature -20°F

1.5.2 Operating Environment

A. Normal Temperature -20° to 110°F

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

2.1.1 Splice Kit

Splice kits for low and medium voltage cables shall be waterproof and shall be in accordance with ANSI C119.1 and IEEE 404 respectively. Raychem RVS and HVS respectively or equal.

2.1.2 PVC Conduit

PVC conduit shall be Schedule 40 or Schedule 80, as shown on the Contract Drawings, in accordance with UL 651.

2.1.3 Sealant

Sealant for preventing moisture from entering conduits shall be a non-oxidizing and noncorrosive compound, Dow Corning 738 or equal.

2.1.4 Pole Mounted Fused Interrupter Switches

2.1.4.1 Fused interrupter switches shall be distribution class, 3 pole for outdoor operation. A disconnect stick shall be provided for switch operation.

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- 2.1.4.2 Fused interrupter switches shall be outdoor type, rated 5 and 15 kV, 60 and 95 kV BIL respectively, 600 amp continuous, 40,000 amp momentary rating silver plated contacts with power fuse size as shown on the Contract Drawings. Fuses shall be in accordance with UL 198G. S&C switches with SMU-20 (15 kV) and SM-5 (5 kV) fuses or equal.
- 2.1.5 Switchboard
- 2.1.5.1 Switchboard assembly shall be of the outdoor dead-front distribution type, containing main circuit breaker, branch circuit breakers with the necessary accessory components, all completely factory assembled and operationally checked in accordance with NEMA PB2 and UL 891.
- 2.1.5.2 Switchboard shall be rated 480 volts, 3 phase, 4 wire and bus ampere capacity as shown on the Contract Drawings. Switchboard interrupting capability is 30,000 minimum amperes.
- 2.1.5.3 Switchboard busing shall be copper, based on 1000 amperes per square inch. Bus bars shall be rigidly braced to comply with the integrated equipment rating of the switchboard.
- 2.1.5.4 Entry of incoming and outgoing lines shall be through the bottom with cable sizes as shown on the Contract Drawings.
- 2.1.5.5 Main circuit breaker shall be adjustable thermal magnetic trip type with built-in ground fault protection with continuous breaker rating as shown on the Contract Drawings. Main circuit breaker shall be provided with double lugs at the line side of circuit breaker where specified on the Attachment A.
- 2.1.5.6 Branch circuit breakers shall be totally front accessible, thermal magnetic trip type with continuous breaker rating as shown on the Contract Drawings.
- 2.1.5.7 Switchboard enclosure size shall be provided large enough to accommodate the main and branch circuit breakers as shown on the Attachment A. Breakers shown with trip rating shall be supplied with the switchboard.
- 2.1.5.8 A lighting fixture with incandescent lamp and a switch shall be provided and shall be suitably located to provide adequate interior lighting. The light fixture shall be rated 120 Vac. The power to the light fixture shall be derived from the switchboard by using a 480-120 Vac potential transformer adequately sized with two primary fuses and one secondary fuse for one leg and the other leg grounded.

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- 2.1.5.9 Each switchboard and its feeder breakers shall have a nameplate as follows:
- 2.1.5.9.1 Nameplates shall be of laminated black and white plastic arranged to show black engraving on white background.
- 2.1.5.9.2 Nameplates sizes shall be 8 inch wide by 1-1/2 inch high for switchboards and 2-1/2 inch wide by 1-1/4 inch high for circuit breakers.
- 2.1.5.9.3 Nameplate letters and/or figures shall be 7/16 inch high for switchboards and 1/8 inch high for circuit breakers.
- 2.1.5.9.4 Nameplate descriptions shall be as shown on the Contract Drawings. Sample nameplates for the switchboard and feeder breakers are shown on the Attachment A.
- 2.1.5.9.5 Nameplates shall be mounted using stainless steel screws. Glued or "Press-On" type of fastening is not acceptable.
- 2.1.5.9.6 The switchboard nameplate shall be mounted in the center of the panel where the main circuit breaker is located and shall be spaced 1-1/2 inch from the top of the panel. The feeder breaker nameplates shall be mounted next to the side of the feeder breaker.
- 2.1.6 Tapes
- 2.1.6.1 Insulating Tape
- Insulating tape shall be vinyl insulating type with a continuous temperature rating of 105°C, in accordance with UL 510. 3M Super 88 Series or equal.
- 2.1.6.2 Marking Tape
- Plastic marking tape for identifying underground electrical cable shall be six inches wide, yellow color, without printing. Reef Industries Terra Tape or equal.
- 2.1.7 Wood Boards
- Boards for protecting underground direct buried cable(s) shall be preservative treated, one inch thick by eight inches wide (nominal).

2.1.8 Ground Conductors

2.1.8.1 Steel Ground Conductors

Grounding cables shall be 7 strand, low carbon grade steel. Coating shall be Class B zinc in accordance with ASTM A475. The main grounding cables and interconnecting runs between ground systems shall be 5/8 inch diameter cable. Branch cables shall be 1/2 inch diameter cable minimum.

2.1.8.2 Copper Ground Conductors

Grounding cable shall be stranded or solid bare copper wire in accordance with ASTM B3. The sizes of the cable are as shown on the Contract Drawings.

2.1.9 Ground Rods

2.1.9.1 Steel Ground Rods

Ground rods shall be 5/8 inch diameter by 8 feet or 10 feet long galvanized steel as shown on Contract Drawings. Joslyn Number J5328 and J5330 or equal.

2.1.9.2 Copperbonded Ground Rods

Copperbonded ground rods shall be 5/8 inch diameter by 8 feet long and in accordance with UL 467. Carolina Catalog Number P588 or equal.

2.1.10 Grounding Assembly

Distribution grounding assembly shall be in accordance with Detail 6, Attachment B.

2.1.11 Ground Connectors

2.1.11.1 Steel Cable to Copper Lug

Steel ground cable to copper lug shall be CADWELD Type "GL" or equal.

2.1.12 Anti-Oxidizing Compound

Anti-oxidizing compound for connections of grounding connectors shall be electrically conductive, rust and corrosion inhibitive, Thomas and Betts Company "Kopr-Shield" or equal.

2.1.13 Exothermic Welds

All ground connections shall be Exothermic type, CADWELD or equal.

2.1.14 Surge Arresters

Surge arresters shall be 5 and 15 kV systems, 60 and 95 kV BIL respectively, distribution class in accordance with ANSI/IEEE C62.11, NEMA LA-1, UL-1449 and with NEMA type "A" bracket for crossarm mounting. Joslyn Catalog numbers J9221-QS and J9251-QS respectively or equal.

2.1.15 Cable Termination Kits

2.1.15.1 Cable termination kit for termination of 15 kV shielded copper conductor cables shall include stress relief cones and shall be in accordance with IEEE 48 and IEEE 404. The size and number of conductors of 15 kV shielded power cables shall be as shown on the Contract Drawings. Raychem HVT or equal.

2.1.15.2 Cable termination kit for termination of 5 kV non-shielded cables shall include insulating tubes and sealant and shall be suitable for outdoor installation. The termination kit shall be in accordance with IEEE 48. Raychem HVT-50 or equal.

2.1.16 Cable to Bus Connection Kits

Cable to bus connection kits shall be made in accordance with ANSI/IEEE C37.20.2. The size of cable shall be as shown on the Contract Drawings. Raychem HVBC or equal.

2.1.17 Wood Poles for Power Distribution

Wood pole shall include shaft and crossarm and shall be designed for the installation of fused interrupter switches and surge arresters.

2.1.17.1 Shaft

2.1.17.1.1 Shaft shall be 45 feet long ANSI Class 2 and shall consist of one piece Western Red Cedar cut round straight wood in accordance with ANSI 05.1. Shaft shall be butt treated and branded or marked in accordance with AWPA C7 and ANSI 05.1 respectively.

2.1.17.1.2 The pole roof and gain shall be factory coated with preservative solution. The top of each pole shall have a one-way roof cut sloping 30 degrees (120 degrees with pole axis) and the cut surface shall face at right angles to the pole face.

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2.1.17.2 Wood Crossarms

Wood crossarms shall be as shown on the Contract Drawings, Attachment B and ANSI 05.3.

2.1.18 5 kV Crossarm Pin Insulator Assembly

5 kV crossarm pin insulator assembly shall consist of a pin type distribution insulator in accordance with ANSI C29.5, Class 55-2 and 5/8" x 6-1/2" long shank forged steel insulator pin, 8 inches high.

2.1.19 5 kV Dead-End Assembly

5 kV dead-end assembly shall consist of a suspension insulator, thimble clevis, eye nut and connector as shown on Detail 1, Attachment B.

2.1.20 15 kV Crossarm Pin Insulator Assembly

15 kV crossarm pin insulator assembly shall consist of a pin type insulator in accordance with ANSI C29.5, Class 55-5 and a 5/8" x 6-1/2" long shank forged steel insulator pin, 8 inches high.

2.1.21 Transformer Padmounts

Transformer padmounts for the 480-208/120V start-up trailer transformers shall be precast type. Padmounts shall be Edison Type 1, Quickset Catalog Number S-1.4-44-1 or equal.

2.1.22 15 kV Dead-End Insulator Assembly

15 kV dead-end insulator assembly shall consist of suspension insulators, strain clamp and eye nut as shown on Detail 2, Attachment B.

2.1.23 Double Crossarm Assembly for Dead-End Loading

Double crossarm assembly for dead-end loading shall consist of crossarms, crossarm braces, machine bolt, washers, carriage bolts, lag screws and double arming bolts as shown on Detail 4, Attachment B.

2.1.24 Down Guy Assembly

Down guy assembly shall consist of 7 guy strands, guy clamps, serving sleeves, strain insulator, pole band, single guy attachment, guy roller, plastic guy guard, anchor rod and helix type anchor as shown on Detail 7, Attachment B.

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2.1.25 Horizontal Guy Assembly

7/16 inch utilities horizontal guy assembly shall consist of 7 guy strands, strain insulators, pole bands and single guy attachment as shown on Detail 7, Attachment B.

2.1.26 Miscellaneous Pole Line Devices

The following materials for the above assemblies shall be as specified below or equal:

Eye-Nuts	Chance Series 6500
Serving Sleeves	Chance Series 6450
Plastic Guy Guard	Joslyn #J1492Y
Threaded Forged-Eye Anchor Rods	Joslyn #J7540
Guy Roller	Hughes Bros #28082/3
Connecting Link	Hughes #3153
Pole Band	Hughes #3105
Guy Grip	Preformed #GDE-1108, BG-2115/6
Guy Clamps	Joslyn #J931
Double Arming Bolts	Joslyn Series #J8800
Machine Bolts	Joslyn Series #J8800, J8700, J8900
Carriage Bolts	Joslyn Series #J8600
Flat Steel Crossarm Braces	Joslyn #J7028
Wood Crossarm Brace	Joslyn #J5188, J5172
Thimble Clevises	Joslyn #J0555
Lag Screws	Joslyn #J8755
Galvanized Staple	Joslyn #J128
Copper-Coated Staple	Joslyn #J6493
Split Bolt Connector, Tinned	Burndy Type KSU
Ground Rod Clamps Galvanized	Joslyn #J8225
Plastic Ground Wire Molding	Joslyn #PM128

Galvanized Ground Rod	Joslyn #J5328
Copperbonded Ground Rod	Joslyn #P588
Ground Rod Clamps Copper	Burndy GRC58

2.1.27 Exterior Lighting Assembly

The pole, luminaire, lamp and bracket arm shall be an integral assembly of exterior lighting designed in accordance with the standards specified in this section and as shown on the Contract Drawings.

2.1.27.1 Luminaire

2.1.27.1.1 Luminaire shall be 95 percent or higher power factor, low pressure sodium, one lamp, 180 watt, 480V, single phase, pole mounted type with two inch slipfitter and clear flat lens, dual in-line fuses and individual photocell control.

2.1.27.1.2 Housing shall be constructed of formed and welded aluminum sheet with integral high power factor ballast in accordance with ANSI C82.9, rated for -20°F starting, enclosed and gasketed suitable for outdoor use. Each housing shall be finished with a zinc-molybdate primer coat, alkyd type, conforming to FS-TT-P-645B, and painted with a medium gray paint, Color No. 16492, pigmented alkyd gloss enamel in accordance with FS-595B. Spaulding Palomar LPS Series or equal.

2.1.27.2 Lamps

Low-pressure sodium (LPS) lamps shall meet ANSI C78.41 for 180 watt lamp type L74. Venture lighting Pro-Arc #76415 or equal.

2.1.27.3 Poles

2.1.27.3.1 Steel Poles

A. The pole assembly complete with luminaire in place shall be capable of withstanding a sustained wind velocity of 70 mph with gust wind velocity of 1.3 times the sustained wind velocity in accordance with AASHTO LTS2.

B. Steel poles shall be 30 feet long, square straight steel and shall include shaft, anchor base, handhole with cover, base cover, anchor bolts, leveling shims, and tenon for mounting two foot side arm with two inch slipfitter. Spaulding 30 foot, square, straight steel pole with finish to match luminaire.

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- C. Shaft shall be 30 feet long and shall consist of one piece square steel tubing in accordance with ASTM A500, Grade B. The shaft shall have a handhole, handhole cover and a terminal for grounding, accessible from the handhole in accordance with National Electrical Code, NFPA 70. The pole shaft top shall be prepared to accept the specified luminaire and bracket arm.
- D. Anchor base shall be circumferentially welded to the pole shaft. The tensile capacity of the weld attaching the shaft to the base shall exceed the tensile capacity of the shaft. The base shall be fabricated from carbon steel in accordance with ASTM A36.
- E. Bracket arm shall be two foot side arm with two inch slip-fitter to match pole top tenon. An opening in the tenon mounting plate shall be part of the continuous wireway from the pole base to the luminaire. Bracket arm primer and paint shall match pole shaft and luminaire finishes. Bracket arm shall be furnished with hardware required for mounting luminaire with two inch slipfitter.
- F. Anchor bolts shall be in accordance with ASTM A307, Grade C ASTM A36 and as shown on the Contract Drawing. Anchor bolt and hex nuts shall be galvanized in accordance with ASTM A153.

2.1.27.3.2 Wood Poles for Lighting

Wood pole shall include shaft and bracket arm and shall be designed for installation of two inch slipfitter type luminaire.

A. Shaft

- 1) Shaft shall be 40 feet long ANSI Class 4 and shall consist of one piece Western Red Cedar cut round straight wood in accordance with ANSI 05.1. Shaft shall be butt treated and branded or marked in accordance with AWP A C7 and ANSI 05.1 respectively.
- 2) The pole roof and gain shall be factory coated with preservative solution. The top of each pole shall have a one-way roof cut sloping 30 degrees (120 degrees with pole axis) and the cut surface shall face at right angles to the pole face.

B. Bracket Arm

Bracket arm shall be a standard steel luminaire support for wood poles. The steel luminaire support shall be hot dip galvanized in accordance with ASTM A153 for lasting protection from the elements and shall have a 2-1/2 foot horizontal length and 8 inch rise. Bracket arm shall be furnished with ground lug assembly and hardware required for mounting luminaire with a two inch slipfitter. Joslyn Catalog Number J728003 or equal.

2.1.27.3.3 Stub Poles

- A. Stub poles shall include shaft and shall be designed for pole support by using horizontal and down guys.
- B. Shaft shall be 40 feet long ANSI Class 4 and shall consist of one piece Western Red Cedar cut round straight wood in accordance with ANSI 05.1. Shaft shall be butt treated and branded or marked in accordance with AWPAC7 and ANSI 05.1 respectively.
- C. The pole roof and gain shall be factory coated with preservative solution. The top of each pole shall have a one-way roof cut sloping 30 degrees (120 degrees with pole axis) and the cut surface shall face at right angles to the pole face.

2.1.28 600 Volt Power Cable

2.1.28.1 General Requirements

2.1.28.1.1 Cable supplied shall be new, and shall be the product of an established manufacturer normally engaged in the production of cable, with a minimum of 5 years documented experience in the manufacture of cable.

2.1.28.1.2 Cable on each reel shall be continuous. Factory splices or factory repairs are not acceptable in individual conductors. Cable shall be free of abrasions and/or abnormalities.

2.1.28.2 Single Conductor Cable

2.1.28.2.1 Design Requirements

- A. Cables herein specified shall be rated 600 volts, Type XHHW in accordance with National Electrical Code, NFPA-70, Article 310 and UL 44. The maximum continuous conductor temperature shall be 90°C for dry and 75°C for wet location. Okonite X-0lene Type XHHW or equal.

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B. Cable sizes smaller than No. 8 shall be solid copper and the size No. 8 and larger shall be stranded copper.

2.1.28.2.2 Conductor

Conductor shall be uncoated, soft or annealed, bare copper wire in accordance with ASTM B3. Stranded conductors shall be Class B, concentric stranded in accordance with Part 2 of NEMA WC7 and ASTM B8.

2.1.28.2.3 Conductor Insulation

The insulation shall be flame-retardant, heat and moisture resistant type of cross-linked-polyethylene compound. The insulation shall be in accordance with Part 3 of NEMA WC7.

2.1.28.2.4 Nominal insulation thickness and maximum wire diameter shall be as follows:

<u>Conductor Size (AWG/KCMIL)</u>	<u>Minimum Insulation Thickness Mils</u>	<u>Maximum Wire O.D. Inches</u>
12	30	0.15
750	80	1.18

2.1.28.3 Multiconductor Direct Burial Cable

2.1.28.3.1 General Requirements

Cables shall have a 600 volt rating. They shall be Type TC multiconductor cable suitable for direct burial in accordance with NFPA 70 (NEC) Articles 340 and 310, UL 1277 and UL 1581. All cables shall include an insulated ground wire. Okonite X-0lene-Okoseal Type TC cable or equal.

2.1.28.3.2 Conductor

Conductors shall be uncoated, annealed, bare copper wire in accordance with ASTM B3 and shall be Class B, concentric stranded in accordance with Part 2 of NEMA WC7 and ASTM B8.

2.1.28.3.3 Conductor Insulation

The conductor insulation shall be flame-retardant, cross-linked-polyethylene compound, type XHHW in accordance with NEMA WC7 and UL 44.

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2.1.28.3.4 Nominal insulation thickness and maximum wire diameter shall be as follows:

<u>Conductor Size (AWG)</u>	<u>Number of Conductors</u>	<u>Minimum Insulation Thickness Mils</u>	<u>Grdg Cond Size (AWG)</u>	<u>Maximum Cable O.D. Inches</u>
10	4	30	1# 10	.58
8	4	45	1# 8	.72

2.1.28.3.5 Jacket

Overall jacket shall be polyvinyl chloride complying with UL 1277 and UL 1581 and shall be sunlight resistant and suitable for direct burial.

2.1.28.3.6 Conductor Identification

Conductors shall be color coded by pigmented insulation as indicated below:

- A. Grounded neutral - Gray
- B. Grounding conductor - Green
- C. Phase "A" conductor - Brown
- D. Phase "B" conductor - Orange
- E. Phase "C" conductor - Yellow

2.1.29 Medium Voltage Cable

2.1.29.1 Underground Cable

2.1.29.1.1 15 kV Cable

A. General

The cable shall be shielded, copper, three conductor, rated 90°C for operation at a nominal 15 kV. The cable shall be suitable for direct burial, and shall be suitable for intermittent or continuous submersion in water.

B. Conductors

The cables shall have copper conductors with concentric lay Class B round stranding in accordance with the requirements of ASTM B8 and NEMA WC8. The conductor sizes shall be as indicated on the Contract Drawings.

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C. Conductor Screen

The stress control layer shall be an extruded semiconducting ethylene-propylene rubber material meeting the requirements of NEMA WC8, AEIC CS6 and UL 1072.

D. Insulation

The primary insulation shall be 15 kV voltage class, ethylene-propylene rubber (133 percent insulation level). It shall meet the requirements of NEMA WC8, UL 1072 and AEIC CS6. The minimum average thickness of insulations shall be 220 mils. The minimum thickness at any point shall not be less than 90 percent of the minimum average.

E. Insulation Screen

The nonmetallic insulation screen shall be an extruded semi-conducting ethylene-propylene rubber material extruded directly over the insulation, and meeting the requirements of NEMA WC8, UL 1072 and AEIC CS6.

F. Metallic Shield

The extruded semi-conducting screen shall be covered with an uncoated copper shielding tape. It shall be applied helically with a 12-1/2 percent minimum overlap.

G. Cable Assembly

The three shielded conductors shall be cabled together with non-hydroscopic moisture resistant fillers and a bare copper grounding conductor in contact with the metal shielded tape between conductors. The cabled assembly shall have a left hand lay and shall provide a round substantially filled core covered by a binder tape overall.

H. Sheath

The three shielded conductors shall have a tight fitting, continuously welded, impervious, corrugated aluminum sheath applied over the cable core in accordance with UL 1072.

I. Grounding Conductor

The three shielded conductors shall have an equipment grounding conductor of uninsulated copper, Class B stranded per ASTM B8 inserted into cable assembly and in contact with

metal shielding tape. The size of the equipment grounding conductor shall be equivalent to that shown on the Contract Drawings.

J. Overall Jacket

A continuous extruded jacket of moisture, heat, oil, and abrasion resistant black polyvinylchloride (PVC) meeting the requirements of NEMA WC8 and UL-1072 shall be applied over the metallic shield. The minimum thickness at any point shall not be less than 80 percent of the minimum average value in accordance with NEMA WC8.

K. Conductor Identification

A colored mylar strip, black/red/blue, shall be placed longitudinally under the copper shield tape for phase identification.

2.1.29.1.2 5 kV Cable

A. General

The cable shall be copper, single conductor and rated 90°C.

B. Conductors

Conductors shall be concentric lay Class B round stranded in accordance with the requirements of ASTM B8 and NEMA WC8. The conductor sizes shall be as indicated on the Contract Drawings.

C. Conductor Screen

The stress control layer shall be an extruded semiconducting ethylene-propylene rubber material meeting the requirements of NEMA WC8, AEIC CS6 and UL 1072.

D. Insulation

The primary insulation shall be 5 kV voltage class, ethylene-propylene rubber (133 percent insulation level). It shall meet the requirements of NEMA WC8 and UL 1072. The minimum average thickness of insulations shall be 125 mils. The minimum thickness at any point shall not be less than 90 percent of the minimum average.

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E. Overall Jacket

A continuous extruded jacket of moisture, heat, oil, and abrasion resistant polyvinylchloride (PVC) meeting the requirements of NEMA WC8 and UL-1072 shall be applied over the insulation. The minimum jacket thickness at any point shall not be less than 80 percent of the minimum average value in accordance with NEMA WC8.

2.1.29.2 Aerial Cable

2.1.29.2.1 General

The cable shall be suitable for overhead installation.

2.1.29.2.2 Conductors

The overhead cable shall be bare aluminum conductor steel reinforced (ACSR) with concentric lay stranded in accordance with ASTM B230, B232 and B498. The conductor type and class shall be as follows:

<u>CONDUCTOR SIZE (AWG/KCMIL)</u>	<u>ACSR STRANDING</u>	<u>CLASS</u>	<u>CODE NAME</u>	<u>RATED BREAKING STRENGTH (POUNDS)</u>
#2	7/1	AA-A	SPARATE	3640
#4	6/1	AA-A	SWAN	1800
336.4	30/7	AA	ORIOLE	17,300

2.1.30 Concrete Boxes

Concrete boxes shall be 12 inch diameter reinforced concrete. Brooks Products "PB" or equal.

2.1.31 Concrete Box Covers

Concrete box covers shall be bolt-down type marked with "GROUND" reinforced concrete for concrete ground box Brooks Products or equal.

2.1.32 Concrete Cone Anchors

Concrete cone anchors shall be rated for 3000 pounds per square inch compressive strength at 28 days. Cones shall have the following dimensions in inches:

Diameter of top	3±1/2
Diameter of bottom	24±1
Diameter of hole through axis	1-3/16±1/16
Height	16±1/2

Concrete cone anchors shall be Reese Concrete Product Manufacturing Co. anchor or equal.

2.1.33 Underground Cable Markers

Route markers shall be galvanized steel with a 3 inch steel helix welded to a 7/16 inch diameter rod. Attached to the rod shall be a 2 inch by 3/4 inch by 30 inch 10 gauge steel stake with a 4 inch by 7 inch steel identification plate mounted near the top. The designation "Cable" with a directional arrow shall be marked on face plate. AB Chance Catalog No. C554-0183.

2.1.34 Hardware

Hardware shall be cadmium plated steel in accordance with ASTM F1135 and the following:

Machine screws	ANSI B1.1, B18.6.3
Machine hex head nuts and bolts	ANSI B1.1, B18.2.1, B18.2.2, ASTM A307
Plain washers	ANSI B18.22.1

2.1.35 PVC Coated Rigid Steel Galvanized

Polyvinyl-Chloride (PVC) externally coated galvanized rigid steel conduit shall be in accordance with NEMA RN-1.

2.1.36 Guy Wire

Guy wire shall be galvanized steel strand in accordance with ASTM A475.

2.2 FABRICATION AND MANUFACTURE

2.2.1 Factory Acceptance Test

2.2.1.1 Medium Voltage Cable

2.2.1.1.1 Each cable shall be subjected to factory tests both underground and overhead cables in accordance with AEIC CS6 and ASTM B498 respectively.

2.2.1.1.2 A certified copy of the actual production test values for both underground and overhead cables shall be provided in accordance with AEIC CS6 and ASTM B498 respectively.

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PART 3 EXECUTION

3.1 INSTALLATION, APPLICATION AND ERECTION

Electrical materials and devices shall be installed in accordance with Specification Section 16100, Electrical Installation.

3.2 FIELD QUALITY CONTROL

Electrical materials and devices shall be inspected and tested in accordance with Specification Section 16905, Electrical Testing.

END OF SECTION

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DATA SHEET

ELECTRICAL MATERIALS AND DEVICES

Specification No.: B-595-C-A170-16110

EQUIPMENT NO.: SB-32T
SERVICE: Switchboard
CONTRACT NO.: 845734
PROJECT: HWVP
BY: R. A. HUR DATE: 03/18/91
REV.: 0 DATE:
CUSTOMER: DOE

1. SB-32T-001

- A. Main Circuit Breaker
1600AT*
- B. Branch Circuit Breakers
 - 8 - 250AF
 - 4 - 100AF
 - 1 - 200AT
 - 1 - 150AT
 - 1 - 30AT
 - 3 - 20AT
 - 1 - 50AT

2. SB-32T-002

- A. Main Circuit Breaker
1600AT*
- B. Branch Circuit Breakers
 - 4 - 250AF
 - 3 - 100AF
 - 1 - 250AT
 - 1 - 150AT
 - 1 - 25AT
 - 5 - 20AT
 - 1 - 30AT

3. SB-32T-003

- A. Main Circuit Breaker
1600AT
- B. Branch Circuit Breakers
 - 13 - 250AF

*Double Lugs
AT: Amp Trip
AF: Amp Frame (Space only)

Rev. 1

DATA SHEET

ELECTRICAL MATERIALS AND DEVICES

Specification No.: B-595-C-A170-16110

EQUIPMENT NO.: SB-32T
SERVICE: Switchboard
CONTRACT NO.: 845734
PROJECT: HWVP
BY: R. A. HUR DATE: 03/18/91
REV.: 0 DATE:
CUSTOMER: DOE

4. SB-32T-004

A. Main Circuit Breaker
1600AT

B. Branch Circuit Breakers

1 - 1600AT
3 - 250AF
1 - 100AF
1 - 20AT
1 - 30AT

5. SB-32T-005

A. Main Circuit Breaker
1600AT

B. Branch Circuit Breakers

4 - 250AF
3 - 125AT
1 - 100AF
5 - 20AT

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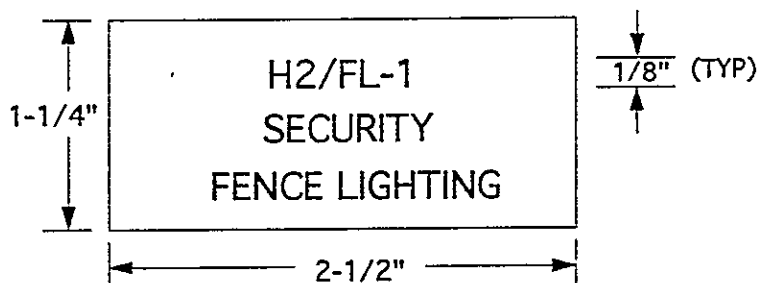
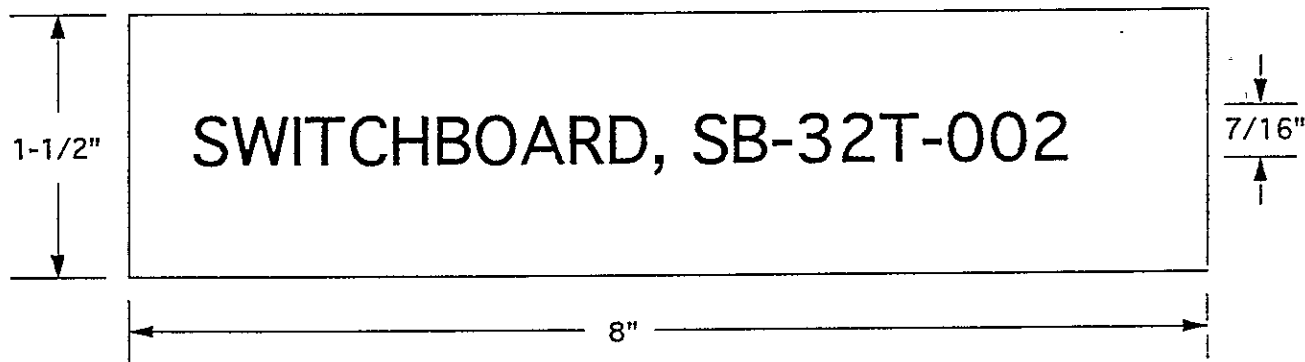
DATA SHEET

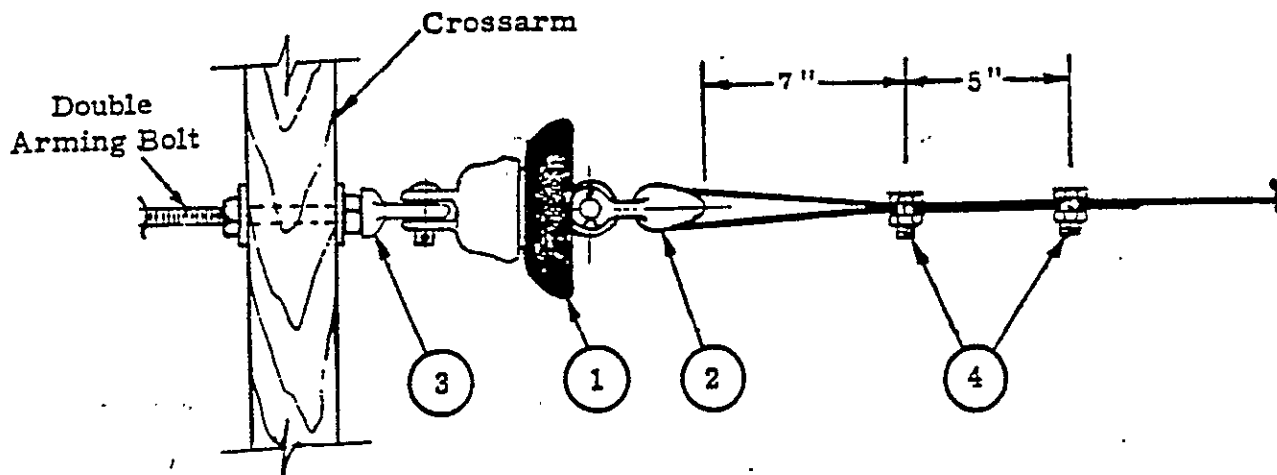
ELECTRICAL MATERIALS AND DEVICES

Specification No.: B-595-C-A170-16110

EQUIPMENT NO.: SB-32T
SERVICE: Switchboard
CONTRACT NO.: 845734
PROJECT: HWVP
BY: R. A. HUR DATE: 03/18/91
REV.: 0 DATE:
CUSTOMER: DOE

SAMPLE NAMEPLATES
NOT TO SCALE



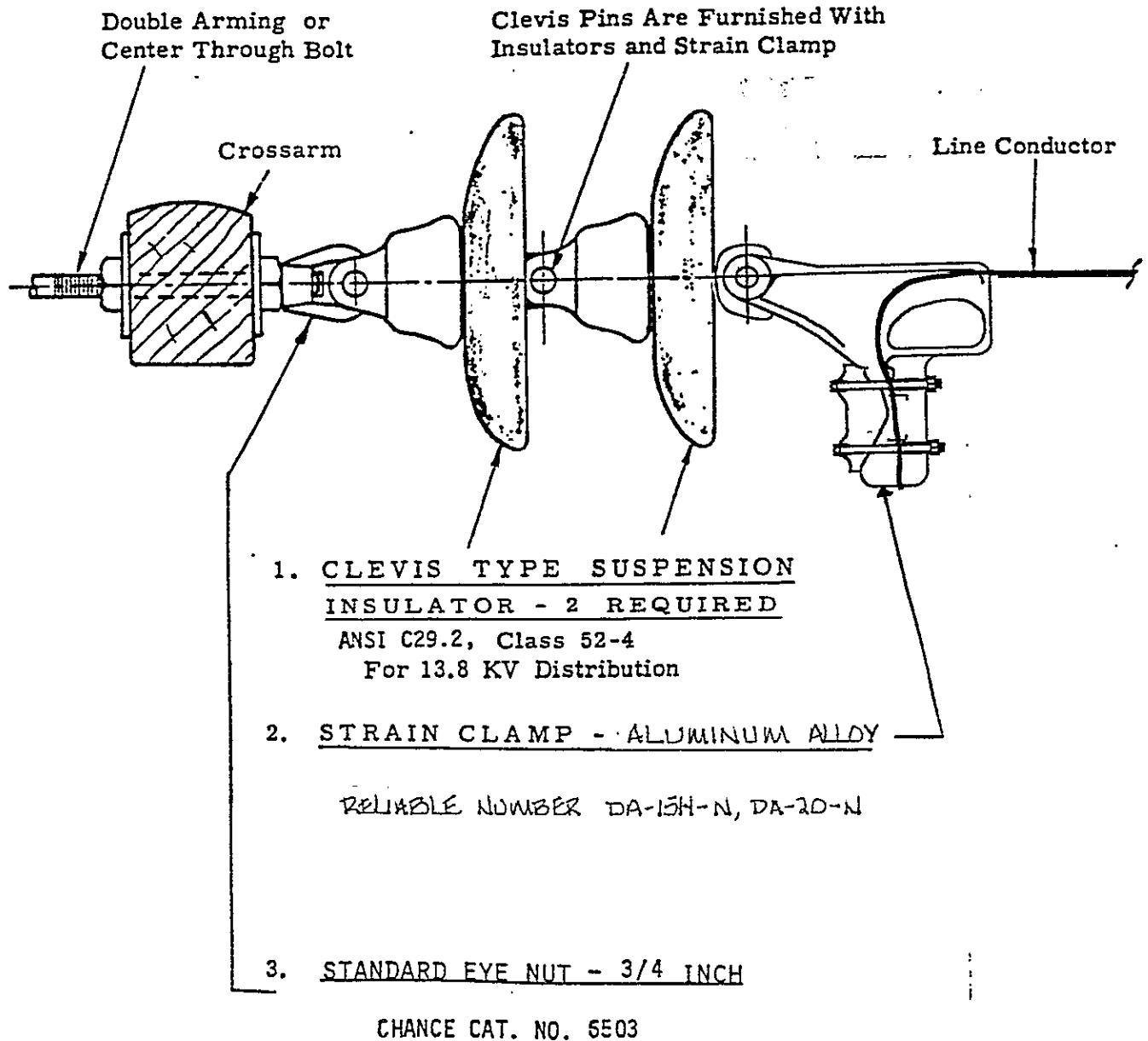


BILL OF MATERIAL		
ITEM NO.	Qty	DESCRIPTION
1	1	Insulator - Suspension, ANSI C29.2, Class 52-1
2	1	Thimble Clevis, Galvanized Forged Steel
3	1	Eye Nut - 5/8" § *
4	2	Connector - Split Bolt, Tinned

* Hardware shall conform to
American National Standard Institute.

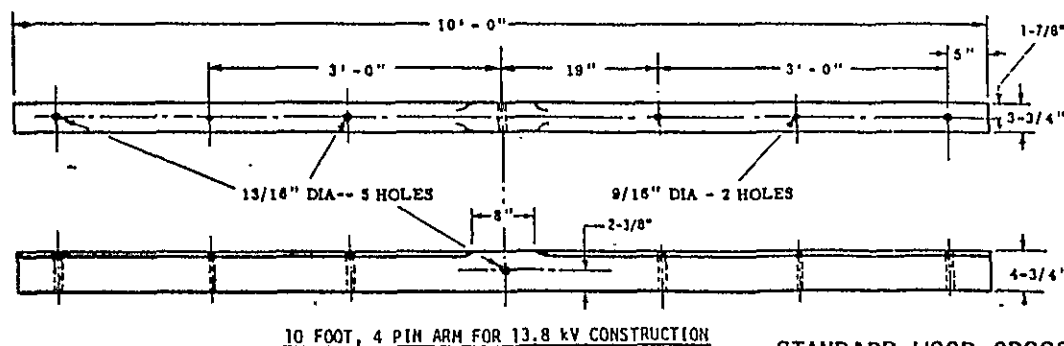
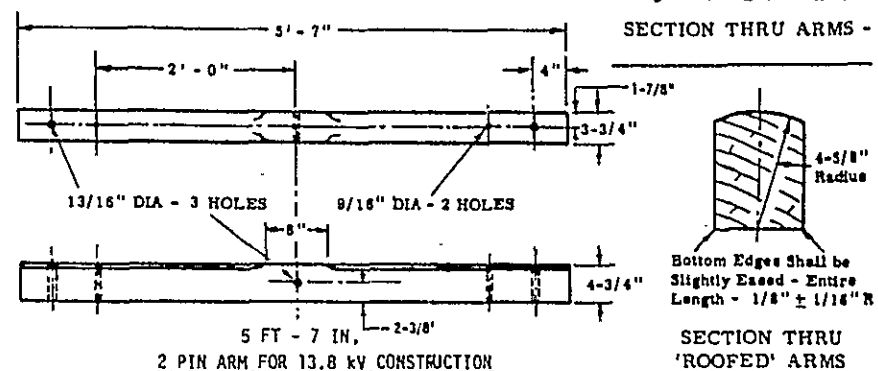
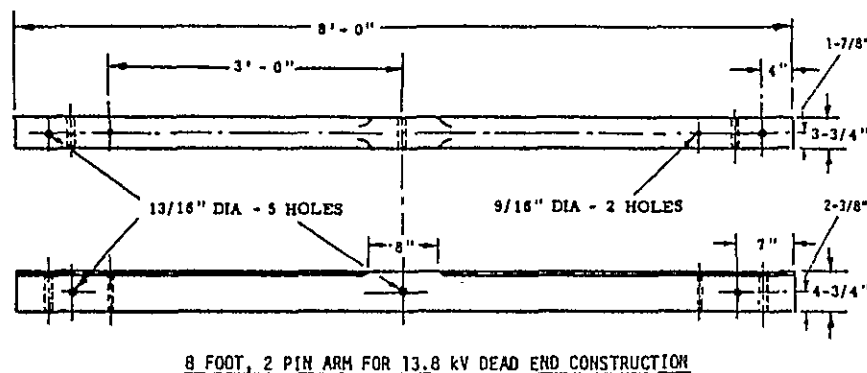
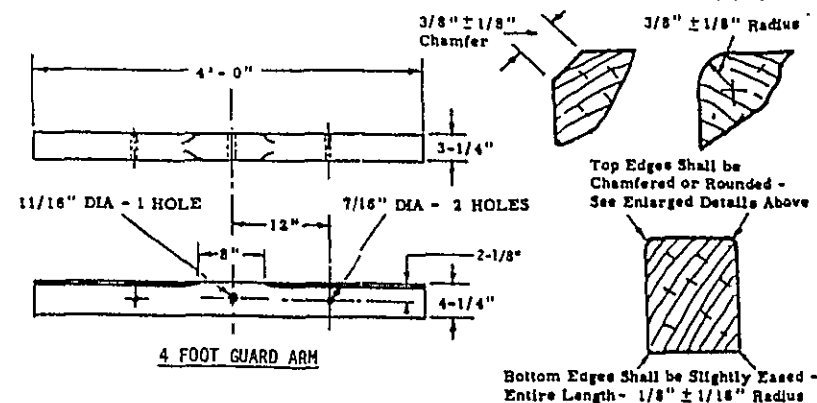
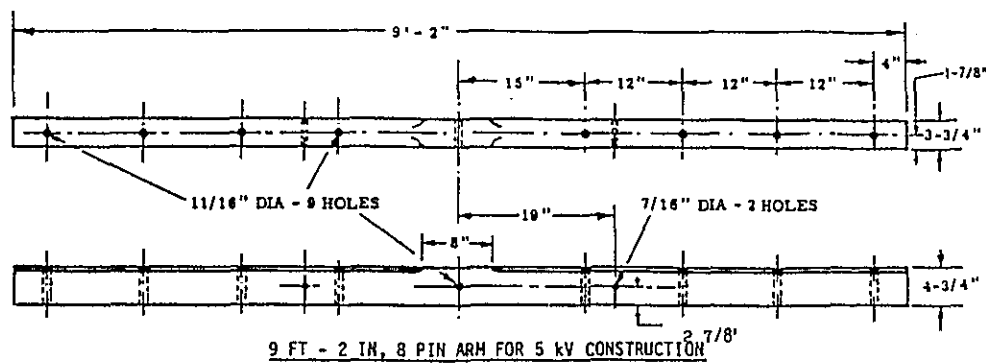
§ Use 5/8" eye nut (item 3) with conductors No. 1/0
Awg and smaller. For heavier construction, use
3/4" eye nut, or 3/4" double arming eye bolts.

PRIMARY DEAD-END ASSEMBLY, 5 kV
DETAIL 1



EACH ITEM SHALL BE AS SPECIFIED OR EQUAL.

DEAD-END INSULATOR ASSEMBLY, 13.8 kV
DETAIL 2



STANDARD WOOD CROSSARM
DETAIL 3

NOTES

1. Crossarms shall be in accordance with ANSI D5.3, DOUGLAS FIR, BROOKS MANUFACTURING CO. OR EQUAL.
2. The identifying letters 'DF' are required.
3. The top center 8 inch dimension shown is for 'roofed' arms. Where arms in accordance with ANSI D5.3 are furnished, the top center 12 inches shall not be chamfered or rounded.

MATERIAL LIST		
Item No.	Qty.	DESCRIPTION
LIGHT CONSTRUCTION - DETAIL A		
1	2c	Crossarm - 9'-2" <i>SEE DETAIL 3</i>
2	4	Crossarm Brace - Flat 7/32" x 1-7/32" x 28"
4	1	Machine Bolt - 5/8" Dia x Length Required *
5	10\$	Washer - 2-1/4" Sq x 3/16" - 11/16" Hole *
6	4	Carriage Bolt - 3/8" x 5" *
7	2	Lag Screw - 1/2" x 5"
8	2w	Double Arming Bolt - 5/8" Dia x Length Req*
HEAVY CONSTRUCTION - DETAIL B		
1	2c	Crossarm - 9'-2" <i>SEE DETAIL 3</i>
3	2	Crossarm Brace - 72" Span - See Note 5 *
4	1	Machine Bolt - 5/8" Dia x Length Required *
9	1	Machine Bolt - 3/4" Dia x Length Required *
10	10\$	Washer - 3" Sq x 1/4" - 13/16" Hole *
11	4	Machine Bolt - 1/2" Dia x 6" *
12	4	Washer - 1-3/8" Rd x 12 Ga - 9/16" Hole *
13	2w	Double Arming Bolt - 3/4" Dia x Length Req*

- * Hardware shall conform to American National Standard Institute.
 c See Note 4 for use of triple arms for dead-ending.
 w Use additional double arming bolts where conductors are dead-ended at positions 2 or 4.
 \$ Add four washers for each additional double arming bolt.

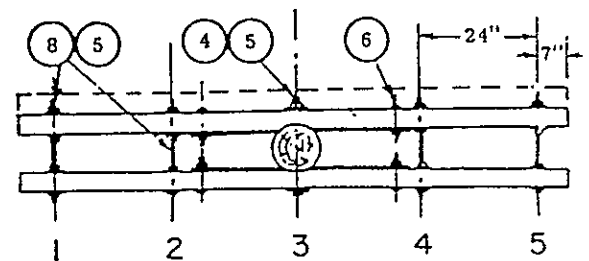
NOTES

- These double crossarm assemblies are for vertical and dead end support of conductors. See other Hanford Elect Stds or the construction drawings for crossarm positions on poles.
- Use light construction for a single power circuit (three conductors) of No. 1/0 Awg or smaller wire having a span length of not over 150 feet. Incidental street or fence lighting wires, dead ended or on pins, may be included.
- Use heavy construction (1) for two power circuits (six conductors) on the same arm, (2) for one circuit of conductors larger than No. 1/0 Awg, or (3) where the span length exceeds 150 feet.
- Use dead end positions as shown below with either light or heavy construction for three-conductor circuits having a span length not exceeding 150 feet on crossarms without arm guys.

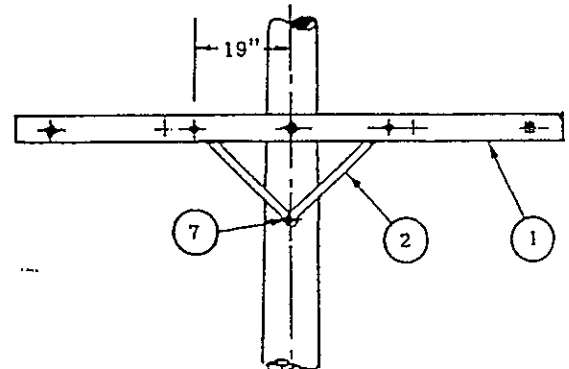
DOUBLE ARM		TRIPLE ARM	
Wire Size Awg	Dead End Position	Wire Size Awg	Dead End Position
2 and smaller	1-2-5 1-4-5	1 and smaller	1-2-5 1-4-5
1	1-3-5	1/0 and 2/0	1-3-5
1/0 to 3/0	2-3-4	4/0 to 250 MCM	2-3-4

- Item 3, Crossarm Brace shall be Douglas Fir treated WITH A FACTORY APPLIED PRESERVATIVE and have galvanized steel end fittings of a type that use a vertical mounting bolt through the crossarm.

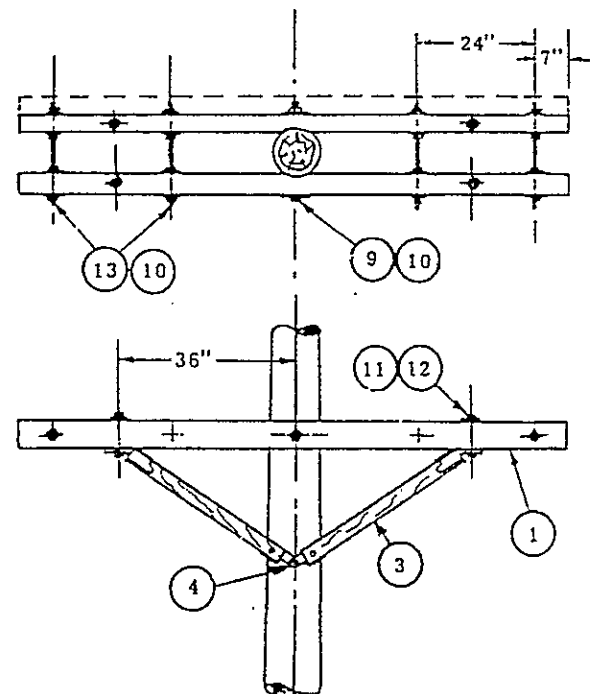
DOUBLE CROSSARM ASSEMBLY FOR VERTICAL AND DEAD-END LOADING DETAIL 4



DEAD ENDING POSITIONS
See Note 4

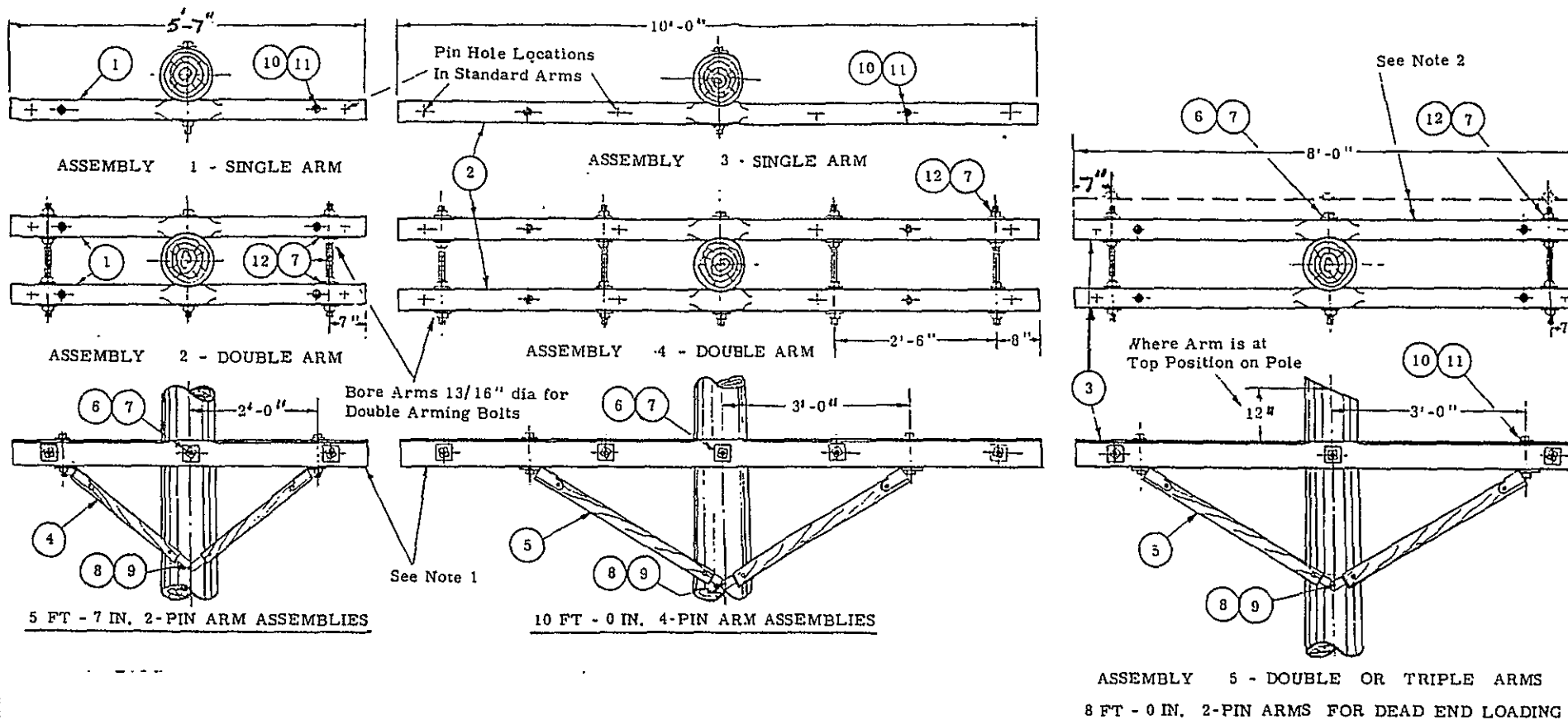


LIGHT CONSTRUCTION - DETAIL A



HEAVY CONSTRUCTION - DETAIL B

9413154.1051



Item No.	ASSEMBLY					QUANTITY	DESCRIPTION
	1	2	3	4	5		
1	1	-	-	-	-	1	Crossarm - 5'-7" SEE DETAIL 3
2	-	-	1	2	-	2	Crossarm - 10'-0" SEE DETAIL 3
3	-	-	-	-	2 or 3	2	Crossarm - 8'-0" SEE DETAIL 3
4	1	2	-	-	-	2	*Crossarm Brace - 48" Span - See Note 3
5	-	-	1	2	2	2	*Crossarm Brace - 72" Span - See Note 3
6	1	1	1	1	1	1	*Machine Bolt - 3/4" x Length Required
7	2	10	2	18	10	10	*Washer - 3" Square x 1/4" x 13/16" Hole
8	1	1	1	1	1	1	*Machine Bolt - 5/8" x Length Required
9	-	-	1	-	-	-	*Washer - 2" Square x 3/16" x 11/16" Hole
10	2	4	2	4	4	4	*Machine Bolt - 1/2" x 6"
11	2	4	2	4	4	4	*Washer - 1 3/8" Round x 12 Gage x 9/16" Hole
12	-	2	-	4	2	2	*Double Arming Bolt - 3/4" x Length Required

MATERIAL LIST
*These items shall conform to American National Standard Institute

NOTES

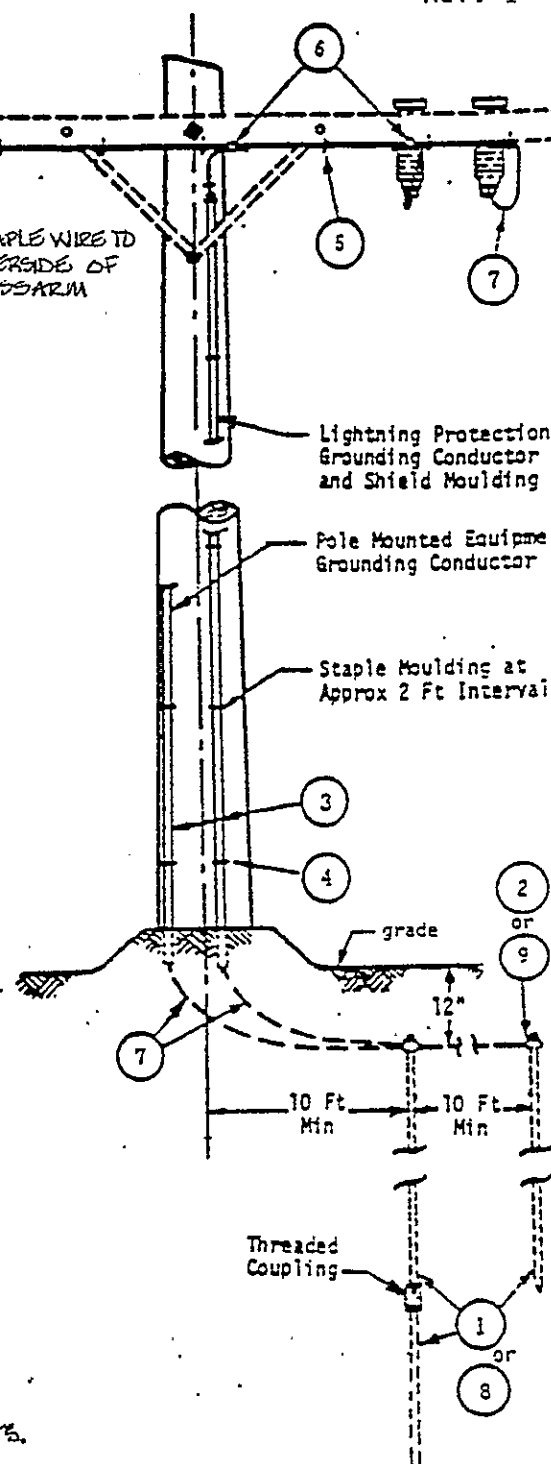
1. Unless otherwise shown on other Standards or the construction drawings, single crossarm assemblies may be used for conductors No. 4/0 Awg and smaller on pin insulators. Double arms shall be used for conductors larger than 4/0 Awg.
2. Use double arms (Assembly 5) for dead ending conductors No. 1 Awg and smaller at arming bolt and center positions. Use triple arms for conductors No. 1/0 Awg and larger.
3. Item 1 and 5, Crossarm Brace shall be Douglas fir treated with A FACTORY APPLIED PRESERVATIVE AND SHALL HAVE galvanized steel end fittings of a type that use a vertical mounting bolt through the crossarm.

WOOD CROSSARM ASSEMBLIES FOR 13.8 kV CONSTRUCTION
DETAIL 5

MATERIAL LIST		
Item No	QUANTITY	DESCRIPTION
		Grounding Assy w/ COPPER BOND ROD
		Grounding Assy w/ Galvanized Ground Rods
1	2	Ground Rod - COPPER BOND , 5/8" Dia x 8'
2	2	Ground Rod Clamp - COPPER 5/8"
3	Reqd	Reqd Plastic Ground wire moulding
4	Reqd	Reqd Staple - Galvanized, 3" x 1-1/16" x 1/4"
5	Reqd	Reqd Staple - COPPER 1-1/4" x 1/4" x 0.114"
6	Reqd	Reqd Connector - Split Bolt - Tinned
7	Reqd	Reqd No. 4 AWG Bare Solid Annealed Copper Wire
8	—	2 Ground Rod - Galvanized, 5/8" Dia X 8'
9	—	2 Ground Rod Clamp - Galvanized, 5/8"

NOTES

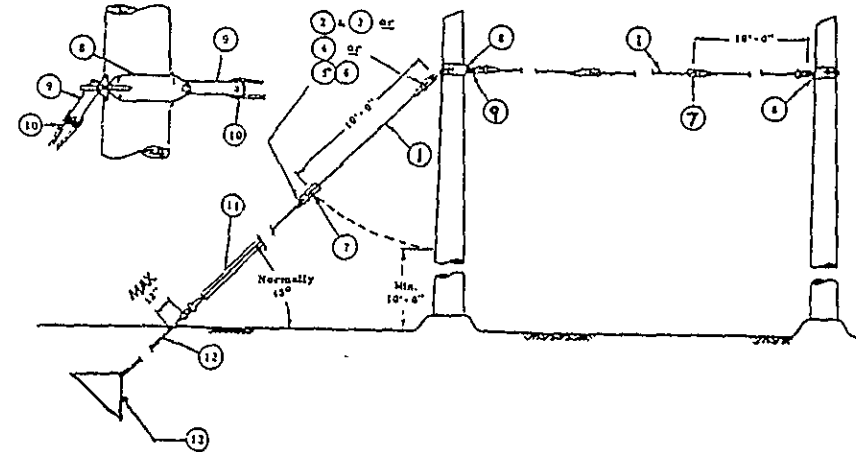
- There shall be no metallic connection, either above grade or underground, between copper grounding system and any buried iron, steel or stainless steel, whether bare, galvanized or otherwise coated, or between galvanized grounding system and any buried copper grounding grids, copper pipe or brass pipe.
- Grounds for lightning protection (arresters, power cable shielding, telephone cable sheaths, etc.) and equipment grounds (transformer tanks, equip housings, conduits, etc.) shall have separate conductors on poles. Common ground rods shall be used as shown. At least two rods shall be installed at each location.
- If a 25 ohms or less drop in resistance cannot be obtained when the first length of grounding rod is driven, a second rod shall be added to reach damp earth.
- Erico Products, Inc., 'Cadweld', or equal, connections may be used in place of the ground rod clamps, item 2 or 9. Galvanized surface damaged during Cadweld shall be treated with Zinc-Rich compound as manufactured by ERICO PRODUCTS.
- See CONTRACT drawings for ground connections on poles.



DISTRIBUTION GROUNDING ASSEMBLY WITH APPROVED GROUND RODS
DETAIL 6

MATERIAL LIST									
45 DEGREE DOWN GUYS 20,500 LBS. ULTIMATE STRENGTH					HORIZONTAL GUYS 14,500 LBS ULTIMATE STRENGTH SEE LOADING TABLE				
ITEM NO	QUANTITY		DESCRIPTION	Alternate Grades of Guy Strand	Length as Required	ITEM NO	QUANTITY		Alternate Grades of Guy Strand
	Insulated Guys	Grounded Guys					Insulated Guys	Grounded Guys	
1			GUY STRAND Grade, Size, and Number of Strands	Extra H. S. 7/16" - 7 High Strength 9/16" - 7 10/16" - 7 1/2" - 7 Extra H. S. 1/2" - 7 Sienens-Martin 5/8" - 19					High Strength 7/16" - 7 Extra H. S. 3/8" - 7 Sienens-Martin 9/16" - 7 or 1 Utilities 7/16" - 7 Sienens-Martin 5/8" - 19
2	4	2	* Guy Clamp-Heavy Type, 3-5/8" Bolts, 6" Long			6	2		
3	4	2	Serving Sleeve - To Solt Guy Strand Used			6	2		
4	4	2	Δ Guy Grip - Preformed Line Products Co., Catalog No.	GDE BG BG BG 1108 2116 2115 2115		6	2		GDE GDE BG GDE 1108 1107 2116 1108
5	2	2	Strandwise Reliable Electric Co. Catalog No.	Short Ball S203 NM S204 S204		2	2		S203 S102 NM S202 NM
6	2	MU	Long Ball	S253 NM S254 S254		4	2		S253 S152 NM S252 NM
7	1	MU	Strain Insulator - ANSI C29.4 Class 54-1			2	MU		
45 DEGREE DOWN GUYS					HORIZONTAL GUYS				
ITEM NO	QUANTITY		DESCRIPTION		ITEM NO	QUANTITY		DESCRIPTION	
8	1		Pole Band - 3/8" x 4" Steel	Hughes Bros. No. 1105	8	1	2	Pole Band	Hughes Bros. No. 1105
9	1		Single Guy Attachment	Hughes Bros. No. 1153	9	2	2	Single Guy Attachment	Hughes Bros. No. 1153
10	1		Guy Roller		10	1	1	Guy Roller	
11	1		Plastic Guy Guard - Yellow -		EACH ITEM SHALL BE AS SPECIFIED OR AN APPROVED EQUAL.				
12	1		Anchor Rod - Double Thimble Eye - 1" x 9'-9"						
13	1		24" CONCRETE CONE ANCHORS (W/SHOULDER OR TWIN)						

- Δ Alternate A * These items shall conform to American National Standard Institute.
- ◇ Alternate B NM Not manufactured for the size of guy strand shown.
- MU Not used for the construction indicated.

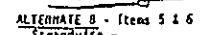


NOTES

- The Loading Table shows the maximum horizontal line loads for which this Standard may be used. Safety factors are for Grade B construction. Allowance has been made in the Bill of Material for the increased tension in the strand and hardware for 45 degree down guys.
- High Strength grade of guy strand shall be used for telephone and 230 KV line guying, and Sienens-Martin grade shall be used for all other electrical distribution guys unless otherwise specified or the use of a substitute grade is specifically approved.
- Where horizontal guys are installed with down guys, the horizontal guy may be the same size strand as that required for the down guy.
- The use of 3-bolt clamp, strandwise, or guy grip hardware is optional at any position in the guy assembly.
- This Standard assembly is designed for telephone and electrical distribution pole guying and should not be applied indiscriminately to other structures.



ALTERNATE A - Item 4
Preformed Guy Grip



ALTERNATE B - Items 5 & 6
Strandwise -
Short Ball for Thimble Eye Hardware
Long Ball for Insulators

ALTERNATE GUY HARDWARE

EXTRA-HEAVY DUTY GUYS - ULTIMATE HORIZONTAL LOAD OF 14,500 LBS MAXIMUM


LOADING TABLE		
Type of Guy	Safety Factor	Maximum Horizontal Line Load - Pounds
Dead Ends	1.5	9700
Longitudinal - General	1.0	14500
Transverse	2.66	5400

EXTRA HEAVY DUTY HORIZONTAL AND DOWN GUY ASSEMBLIES DETAIL 7

D.O.E.

MAY 18 1992



1	5/13/92	REVISED TITLE BLOCK AND MAPS	JLD	GO	JLD	AKK
		PER CRO724	EJ	AKY	AKK	RAP
0	12/19/91	APPROVED FOR CONSTRUCTION	SC	BR	WF KAO	GNK
			CCB	AKY	JGK	RNG
REV NO.	DATE	REVISION DESCRIPTION	APPROVAL INITIALS			
CADFILE	B122105A		CADCODE	2B:IBM:ACD2:10.C2:SS		
ENGINEERING RELEASE		U.S. DEPARTMENT OF ENERGY Richland Operations Office DE - AC06-86RL10838				
REV. _____ DATE _____						
ERO. _____		 FLUOR DANIEL, INC. ADVANCED TECHNOLOGY DIVISION				
SIGNATURE						
DATE		CONSTRUCTION POWER TITLE SHEET				
PROJ. DIR.						
R.N. GIBBONS						
Q.A. ENGR.						
J.G. KELLY						
INDEPENDENT SAFETY						
A.K. YEE						
PROJECT PKG ENGINEER						
C.C. BUSCHMANN						
ENGINEERING MGR.						
G.N. KIMURA		PROJECT TITLE HANFORD WASTE VITRIFICATION PLANT				
SUPERVISOR						
W. FRENCH K.A. OWREY						
12-11-91						
DESIGN ENGINEER		PROJECT B-595				
B. RETTIG						
CHECKED		FLUOR CONTRACT NO.		CWBS NO.		
S. CLARK		8457		A170		
DRAWN		BLDG. NO.		INDEX NO.		
H. MELGARES		SCALE		NONE		
CLASSIFICATION		DRAWING NUMBER		SHEET		
NONE		H-2-122105		1		
BY		NOT REQ'D		OF		
				1		
				REV.		
				1		

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DISTRIBUTION CODE:

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INITIALS: SC

DATE: 04-24-92

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MAY 18 1992

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1	5/13/92	REVISED TITLE BLOCK, DRAWING INDEX & MAP PER CRO724	JLD	AK	JLD	AK
0	12/19/91	APPROVED FOR CONSTRUCTION	SC	BR	WF KAO	GNK
			CCB	AKY	JGK	RNG
REV NO.	DATE	REVISION DESCRIPTION	APPROVAL INITIALS			
CADFILE	B122106A		CADCODE	2B:IBM:ACD2:10.C2:SS		
ENGINEERING RELEASE		U.S. DEPARTMENT OF ENERGY Richland Operations Office DE - AC06-86RL10838				
REV. _____ DATE _____ ERO. _____						
SIGNATURE		DATE	 FLUOR DANIEL, INC. ADVANCED TECHNOLOGY DIVISION CONSTRUCTION POWER DRAWING INDEX			
PROJ. DIR. R.N. GIBBONS		12-19-91				
Q.A. ENGR. J.G. KELLY		12-12-91				
INDEPENDENT SAFETY A.K. YEE		12-12-91				
PROJECT PKG ENGINEER C.C. BUSCHMANN		12-12-91				
ENGINEERING MGR. G.N. KIMURA		12-12-91				
SUPERVISOR W. FRENCH K.A. OWREY		12-11-91	PROJECT TITLE HANFORD WASTE VITRIFICATION PLANT			
DESIGN ENGINEER B. RETTIG		12-11-91				
CHECKED S. CLARK		12-11-91				
DRAWN H. MELGARES			PROJECT B-595	FLUOR CONTRACT NO. 8457	CWBS NO. A170	
			SCALE NONE	BLDG. NO.	INDEX NO.	
CLASSIFICATION	BY	DRAWING NUMBER	SHEET	OF	REV.	
NONE	NOT REQ'D	H-2-122106	1	1	1	

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DISTRIBUTION CODE:

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INITIALS: SC

DATE: 04-24-92

MAY 18 1992

1	5/12/92	REVISED SYMBOL, ABBREVIATIONS, AND TITLE BLOCK PER CR #0724	KK	WF	KA	SK
0	12/19/91	APPROVED FOR CONSTRUCTION	EJ	AKY	WF	GNK
			SC	BR	KA	
			CCB	AKY	JGK	RNG
REV NO.	DATE	REVISION DESCRIPTION	APPROVAL INITIALS			

CADFILE	B122107A	CADCODE	2B:IBM:ACD2:10.C2:SS
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ENGINEERING RELEASE
REV. _____ DATE _____
ERO. _____

U.S. DEPARTMENT OF ENERGY
Richland Operations Office
DE - AC06-86RL10838

SIGNATURE	DATE
PROJ. DIR. R.N. GIBBONS	12-19-91
Q.A. ENGR. J.G. KELLY	12-12-91
INDEPENDENT SAFETY A.K. YEE	12-12-91
PROJECT PKG ENGINEER C.C. BUSCHMANN	12-12-91
ENGINEERING MGR. G.N. KIMURA	12-12-91
SUPERVISOR W. FRENCH K.A. OWREY	12-11-91
DESIGN ENGINEER B. RETTIG	12-11-91
CHECKED S. CLARK	12-11-91
DRAWN M. KHOURI	

 FLUOR DANIEL, INC.
ADVANCED TECHNOLOGY DIVISION

ELECTRICAL GENERAL NOTES AND SYMBOLS

PROJECT TITLE
HANFORD WASTE VITRIFICATION PLANT

PROJECT B-595	FLUOR CONTRACT NO. 8457	CWBS NO. A170
SCALE NONE	BLDG. NO. ---	INDEX NO.

CLASSIFICATION NONE	BY NOT REQ'D	DRAWING NUMBER H-2-122107	SHEET 1	OF 1	REV. 1
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DISTRIBUTION CODE:

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INITIALS:


DATE:

NOTES:

1. FOR GENERAL NOTES AND SYMBOLS,
SEE DWG H-2-122107.

MAY 18 1992

SAFETY CLASS 4 (REF)

1	5/13/92	REVISED TITLE BLOCK PER CR #0724	KK	WF	KEO	SMK
			EJ	AKY	PH	LOP
0	12/19/91	APPROVED FOR CONSTRUCTION	SC	BR	WF	GNK
			CCB	AKY	JGK	RNG
REV NO.	DATE	REVISION DESCRIPTION	APPROVAL INITIALS			
CADFILE	B122108A		CADCODE	2B:IBM:ACD2:10.C2:SS		
ENGINEERING RELEASE REV. _____ DATE _____ ERO. _____			U.S. DEPARTMENT OF ENERGY Richland Operations Office DE - AC06-86RL10838			
SIGNATURE		DATE	 FLUOR DANIEL, INC. ADVANCED TECHNOLOGY DIVISION ELECTRICAL STANDARD ASSEMBLIES AND DETAILS			
PROJ. DIR. R.N. GIBBONS		12-19-91				
Q.A. ENGR. J.G. KELLY		12-12-91				
INDEPENDENT SAFETY A.K. YEE		12-12-91				
PROJECT PKG ENGINEER C.C. BUSCHMANN		12-12-91				
ENGINEERING MGR. G.N. KIMURA		12-12-91				
SUPERVISOR W. FRENCH K.A. OWREY		12-11-91				
DESIGN ENGINEER B. RETTIG		12-11-91	PROJECT TITLE HANFORD WASTE VITRIFICATION PLANT			
CHECKED S. CLARK		12-11-91	PROJECT B-595	FLUOR CONTRACT NO. 8457	CWBS NO. A170	
DRAWN M. KHOURI			SCALE NONE	BLDG. NO. ---	INDEX NO.	
CLASSIFICATION	BY	DRAWING NUMBER	SHEET	OF	REV.	
NONE	NOT REQ'D	H-2-122108	1	1	1	

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ING INDEX

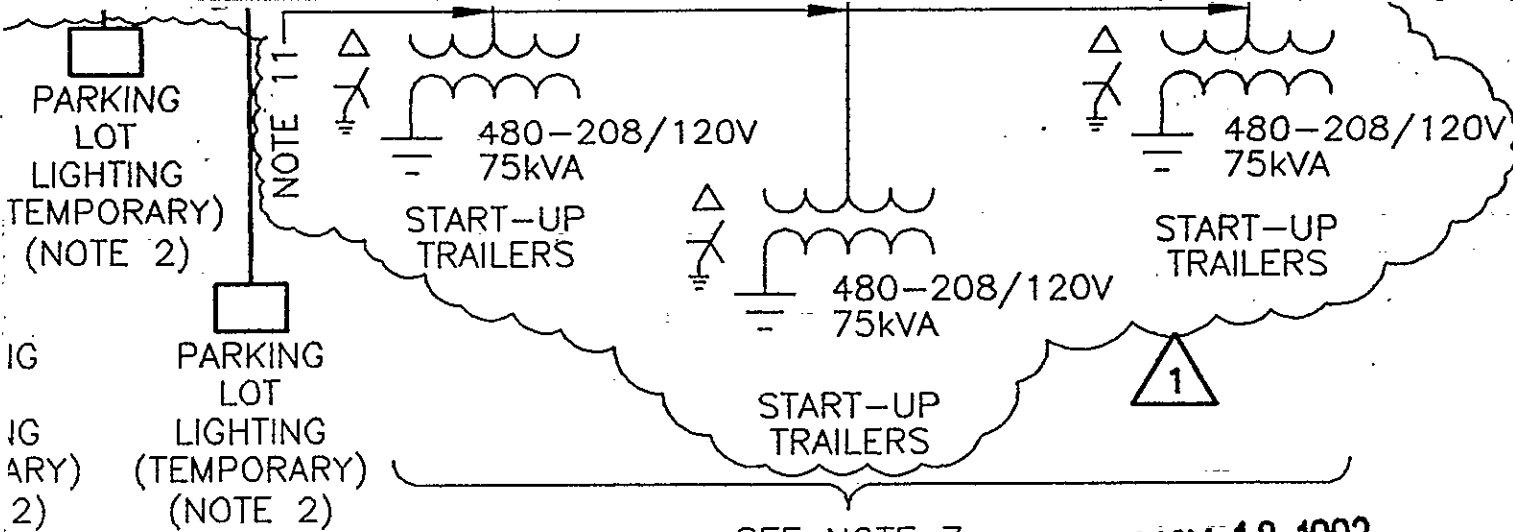
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INITIALS:
DATE:



SEE NOTE 7

MAY 18 1992

SAFETY CLASS 4 (REF)



1	5/13/92	UPDATED LOADS, ADDED GROUND	KK	WF	RO	RER	
		PROTECTION PER CR #0677 & 0724	EJ	AKY	WH	ROP	
		REVISED TITLE BLOCK					
0	12/19/91	APPROVED FOR CONSTRUCTION	SC	BR	WF	GNK	
			CCB	AKY	JGK	RNG	
REV NO.	DATE	REVISION DESCRIPTION		APPROVAL INITIALS			
CADFILE	B122109A		CADCODE	2B:BM:ACD2:10.C2:SS			
ENGINEERING RELEASE		U.S. DEPARTMENT OF ENERGY Richland Operations Office DE - AC06-86RL10838					
REV. _____ DATE _____							
ERO. _____		 FLUOR DANIEL, INC. ADVANCED TECHNOLOGY DIVISION					
SIGNATURE							
1	PROJ. DIR.	R.N.GIBBONS	12-19-91	ELECTRICAL CONSTRUCTION POWER ONE-LINE DIAGRAM			
	Q.A. ENGR.	J.G.KELLY	12-12-91				
	INDEPENDENT SAFETY	A.K.YEE	12-12-91				
	PROJECT PKG ENGINEER	C.C.BUSCHMANN	12-12-91				
	ENGINEERING MGR.	G.N.KIMURA	12-12-91				
	SUPERVISOR	W.FRENCH K.A.OWREY	12-11-91				
DESIGN ENGINEER		B.RETTIG	12-11-91	PROJECT TITLE			
CHECKED		S.CLARK	12-11-91	HANFORD WASTE VITRIFICATION PLANT			
DRAWN		M.KHOURI		PROJECT	FLUOR CONTRACT NO.	OWBS NO.	
CLASSIFICATION		NONE	BY	NOT REQ'D	B-595	8457	A170
				SCALE	BLDG. NO.	INDEX NO.	
				DRAWING NUMBER	H-2-122109	SHEET	OF
						1	1
							REV.
							1

MAY 18 1992



GRAPHIC SCALE

SAFETY CLASS 4 (REF)

1	5/13/92	ADDED COORDINATES TO EXISTING POLES,	KK	WF	XOO	AK
		REVISED WATER LINES CAUTION NOTE, TITLE	EJ	AY	PK	BP
		BLOCK & NOTE 2 PER CR #0659 & 0724.				
0	12/19/91	APPROVED FOR CONSTRUCTION	SC	BR	WF KAO	GNK
			CCB	AKY	JGK	RNG
REV NO.	DATE	REVISION DESCRIPTION	APPROVAL INITIALS			
CADFILE	B122110A		CADCODE	2B:BM:ACD2:10.C2:SS		
ENGINEERING RELEASE		U.S. DEPARTMENT OF ENERGY Richland Operations Office DE - AC06-86RL10838				
REV. _____ DATE _____						
ERO. _____		 FLUOR DANIEL, INC. ADVANCED TECHNOLOGY DIVISION				
SIGNATURE						
	PROJ. DIR.	R.N. GIBBONS	12-19-91	ELECTRICAL SITE DEMOLITION PLAN		
	Q.A. ENGR.	J.G. KELLY	12-12-91			
	INDEPENDENT SAFETY	A.K. YEE	12-12-91			
	PROJECT PKG ENGINEER	C.C. BUSCHMANN	12-12-91			
	ENGINEERING MGR.	G.N. KIMURA	12-12-91			
	SUPERVISOR	W. FRENCH K.A. OWREY	12-11-91			
	DESIGN ENGINEER	B. RETTIG	12-11-91			
	CHECKED	S. CLARK	12-11-91			
DRAWN	M. KHOURI		PROJECT TITLE HANFORD WASTE VITRIFICATION PLANT			
CLASSIFICATION		BY	DRAWING NUMBER	SHEET	OF	REV.
NONE		NOT REQ'D	H-2-122110	1	1	1

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GRAPHIC SCALE

MAY 18 1992

SAFETY CLASS 4 (REF)

1	5/13/92	ADDED COORDINATES TO NEW POLES, REV	KK	WF	KEO	RCR
		WATER LINES CAUTION NOTE & TITLE BLOCK	EJ	AKY	WHL	LOD
		PER CR #0659 & 0724				
0	12/19/91	APPROVED FOR CONSTRUCTION	SC	BR	WF KAO	GNK
			CCB	AKY	JGK	RNG
REV NO.	DATE	REVISION DESCRIPTION	APPROVAL INITIALS			

CADFILE	B122111A	CADCODE	2B:IBM:ACD2:10.C2:SS
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ENGINEERING RELEASE
REV. _____ DATE _____
ERO. _____

U.S. DEPARTMENT OF ENERGY

Richland Operations Office
DE - AC06-86RL10838

SIGNATURE	DATE
PROJ. DIR. R.N.GIBBONS	12-19-91
Q.A. ENGR. J.G.KELLY	12-12-91
INDEPENDENT SAFETY A.K.YEE	12-12-91
PROJECT PKG ENGINEER C.C.BUSCHMANN	12-12-91
ENGINEERING MGR. G.N.KIMURA	12-12-91
SUPERVISOR W.FRENCH K.A.OWREY	12-11-91
DESIGN ENGINEER B.RETTIG	12-11-91
CHECKED S.CLARK	12-11-91
DRAWN M.KHOURI	



FLUOR DANIEL, INC.
ADVANCED TECHNOLOGY DIVISION

ELECTRICAL POLE LINE RELOCATION PLAN

INDEX

PROJECT TITLE		HANFORD WASTE VITRIFICATION PLANT			
PROJECT	B-595	FLUOR CONTRACT NO.	8457	CWBS NO.	A170
SCALE	1"=100'-0"	BLDG. NO.	---	INDEX NO.	
CLASSIFICATION	NONE	BY	NOT REQ'D	DRAWING NUMBER	H-2-122111
		SHEET	1	OF	1
		REV.	1		

DISTRIBUTION CODE:

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DATE:

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5 REQ'D
ANCHOR
INSULATOR ASSEMBLY 5KV
LAMP

MAY 18 1992

SAFETY CLASS 4 (REF)

1	5/13/92	REVISED TITLE BLOCK, DETAILS 2 & 4, ADDED CONCRETE ANCHOR DEPTH PER CR #0724	KK	WF	WAO	RR
0	12/19/91	APPROVED FOR CONSTRUCTION	SC	BR	WF	GNK
			CCB	AKY	JGK	RNG
REV NO.	DATE	REVISION DESCRIPTION	APPROVAL INITIALS			
CAD FILE	B122112A		CAD CODE	2B:IBM:ACD2:10.C2:SS		
ENGINEERING RELEASE REV. _____ DATE _____ ERO. _____		U.S. DEPARTMENT OF ENERGY Richland Operations Office DE - AC06-86RL10838				
SIGNATURE		DATE	 FLUOR DANIEL, INC. ADVANCED TECHNOLOGY DIVISION ELECTRICAL POLE LINE DETAILS			
PROJ. DIR. R.N.GIBBONS		12-19-91				
Q.A. ENGR. J.G.KELLY		12-12-91				
INDEPENDENT SAFETY A.K.YEE		12-12-91				
PROJECT PKG ENGINEER C.C.BUSCHMANN		12-12-91				
ENGINEERING MGR. G.N.KIMURA		12-12-91				
SUPERVISOR W.FRENCH K.A.OWREY		12-11-91				
DESIGN ENGINEER B.RETTIG		12-11-91	PROJECT TITLE HANFORD WASTE VITRIFICATION PLANT			
G INDEX	CHECKED S.CLARK	12-11-91	PROJECT B-595	FLUOR CONTRACT NO. 8457	CWBS NO. A170	
	DRAWN M.KHOURI		SCALE NONE	BLDG. NO.	INDEX NO.	
	CLASSIFICATION NONE	BY NOT REQ'D	DRAWING NUMBER H-2-122112		SHEET 1	OF 2

DISTRIBUTION CODE:


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INITIALS:
DATE:

MAY 18 1992

SAFETY CLASS 4 (REF)

1	5/13/92	REVISED TITLE BLOCK, DET 5, 6, 8 PER CR#0724.	KK	WF	KEO	gsk
0	12/19/91	APPROVED FOR CONSTRUCTION	EJ	AKY	AK	LOP
			SC	BR	WF KAO	GNK
			CCB	AKY	JGK	RNG
REV NO.	DATE	REVISION DESCRIPTION	APPROVAL INITIALS			
CADFILE	B122112B		CADCODE	2B:IBM:ACD2:10.C2:SS		
ENGINEERING RELEASE		U.S. DEPARTMENT OF ENERGY Richland Operations Office DE - AC06-86RL10838				
REV. _____ DATE _____ ERO. _____						
SIGNATURE		DATE	 FLUOR DANIEL, INC. ADVANCED TECHNOLOGY DIVISION ELECTRICAL POLE LINE DETAILS			
PROJ. DIR. R.N. GIBBONS		12-19-91				
Q.A. ENGR. J.G. KELLY		12-12-91				
INDEPENDENT SAFETY A.K. YEE		12-12-91				
PROJECT PKG ENGINEER C.C. BUSCHMANN		12-12-91				
ENGINEERING MGR. G.N. KIMURA		12-12-91				
SUPERVISOR W. FRENCH K.A. OWREY		12-11-91				
DESIGN ENGINEER B. RETTIG		12-11-91	PROJECT TITLE HANFORD WASTE VITRIFICATION PLANT			
CHECKED S. CLARK		12-11-91	PROJECT B-595	FLUOR CONTRACT NO. 8457	CWBS NO. A170	
DRAWN M. KHOURI			SCALE NONE	BLDG. NO. ---	INDEX NO.	
CLASSIFICATION	BY	DRAWING NUMBER	SHEET	OF	REV.	
NONE	NOT REQ'D	H-2-122112	2	2	1	

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EXTENDING BEYOND SHOULDER ON BOTH SIDES. CONDUITS SHALL BE ENCASED IN 3" CONCRETE ENVELOPE AND SHALL HAVE LOCATION OF EACH PLUGGED END IDENTIFIED BY ABOVE GROUND MARKERS.

0 50 100 200 300 400 500

GRAPHIC SCALE

MAY 18 1992

SAFETY CLASS 4 (REF)

1	5/13/92	ADDED COORDINATES TO POLES & CONC TO	KK	WF	700	SAK
		13.8 KV DB CABLES PER CR #0677, REV	EL	AKY	JK	DP
		WATER LINES CAUTION NOTE, TITLE BLOCK				
		# CONC NOTES PER CR #0659 &				
		3724				
0	12/19/91	APPROVED FOR CONSTRUCTION	SC	BR	WF	GNK
			CCB	AKY	JGK	RNG
REV NO.	DATE	REVISION DESCRIPTION	APPROVAL INITIALS			
CADFILE	B122126A		CADCODE	2B:IBM:ACD2:10.C2:SS		
ENGINEERING RELEASE		U.S. DEPARTMENT OF ENERGY Richland Operations Office DE - AC06-86RL10838				
REV. _____	DATE _____					
ERO. _____		 FLUOR DANIEL, INC. ADVANCED TECHNOLOGY DIVISION				
SIGNATURE	DATE					
PROJ. DIR.	12-19-91	ELECTRICAL CONSTRUCTION UTILITIES OVERALL DISTRIBUTION PLAN				
R.N. GIBBONS						
O.A. ENGR.	12-12-91					
J.G. KELLY						
INDEPENDENT SAFETY	12-12-91					
A.K. YEE						
PROJECT PKG ENGINEER	12-12-91					
C.C. BUSCHMANN						
ENGINEERING MGR.	12-12-91					
G.N. KIMURA						
SUPERVISOR	12-11-91	PROJECT TITLE HANFORD WASTE VITRIFICATION PLANT				
W.FRENCH K.A. OWREY						
DESIGN ENGINEER	12-11-91					
B. RETTIG						
CHECKED	12-11-91	PROJECT	FLUOR CONTRACT NO.	CWBS NO.		
S. CLARK		B-595	8457	A170		
DRAWN		SCALE	BLDG. NO.	INDEX NO.		
M. KHOURI		1"=100'-0"	---			
CLASSIFICATION	BY	DRAWING NUMBER	SHEET	OF	REV.	
NONE	NOT REQ'D	H-2-122126	1	1	1	

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DATE:

MAY 18 1992

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SAFETY CLASS 4 (REF)

1	5/13/92	REVISED TITLE BLOCK PER CR#0724.	KK	AF	KAO	GNK
0	12/19/91	APPROVED FOR CONSTRUCTION	EJ	AKY	WF	GNK
			SC	BR	KAO	GNK
			CCB	AKY	JGK	RNG
REV NO.	DATE	REVISION DESCRIPTION	APPROVAL INITIALS			

CADFILE	B122134A	CADCODE	2B:IBM:ACD2:10.C2:SS
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ENGINEERING RELEASE
REV. _____ DATE _____
ERO. _____

U.S. DEPARTMENT OF ENERGY

Richland Operations Office
DE - AC06-86RL10838

SIGNATURE	DATE
PROJ. DIR. R.N. GIBBONS	12-19-91
O.A. ENGR. J.G. KELLY	12-12-91
INDEPENDENT SAFETY A.K. YEE	12-12-91
PROJECT PKG ENGINEER C.C. BUSCHMANN	12-12-91
ENGINEERING MGR. G.N. KIMURA	12-12-91
SUPERVISOR W. FRENCH K.A. OWREY	12-11-91
DESIGN ENGINEER B. RETTIG	12-11-91
CHECKED S. CLARK	12-11-91
DRAWN M. KHOURI	



FLUOR DANIEL, INC.
ADVANCED TECHNOLOGY DIVISION

ELECTRICAL CONSTRUCTION UTILITIES DETAILS

PROJECT TITLE	HANFORD WASTE VITRIFICATION PLANT
PROJECT	B-595
FLUOR CONTRACT NO.	8457
CWBS NO.	A170
SCALE	NONE
BLDG. NO.	---
INDEX NO.	

CLASSIFICATION	BY
NONE	NOT REQ'D

DRAWING NUMBER	SHEET	OF	REV.
H-2-122134	1	3	1

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DATE:

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STRUCTURAL DWG H-2-118062.

3. FOR GENERAL NOTES & SYMBOLS SEE DWG H-2-122107.

MAY 18 1992

SAFETY CLASS 4 (REF)

1	5/13/92	REVISED TITLE BLOCK PER CR #0724	KK	WF	WAO	SK
			EJ	AKY	SK	LP
0	12/19/91	APPROVED FOR CONSTRUCTION	SC	BR	WF	GNK
			CCB	AKY	JGK	RNG
REV NO.	DATE	REVISION DESCRIPTION	APPROVAL INITIALS			
CADFILE	B122134B		CADCODE	2B:IBM:ACD2:10.C2:SS		
ENGINEERING RELEASE		U.S. DEPARTMENT OF ENERGY Richland Operations Office DE - AC06-86RL10838				
REV. _____ DATE _____ ERO. _____						
1	SIGNATURE	DATE	 FLUOR DANIEL, INC. ADVANCED TECHNOLOGY DIVISION			
	PROJ. DIR. G.N. GIBBONS	12-19-91				
	Q.A. ENGR. J.G. KELLY	12-12-91				
	INDEPENDENT SAFETY A.K. YEE	12-12-91				
	PROJECT PKG ENGINEER C.C. BUSCHMANN	12-12-91				
	ENGINEERING MGR. G.N. KIMURA	12-12-91				
	SUPERVISOR W. FRENCH K.A. OWREY	12-11-91				
DESIGN ENGINEER B. RETTIG		12-11-91	PROJECT TITLE HANFORD WASTE VITRIFICATION PLANT			
CHECKED S. CLARK	12-11-91	PROJECT B-595	FLUOR CONTRACT NO. 8457	CWBS NO. A170		
DRAWN M. KHOURI		SCALE NONE	BLDG. NO. ---	INDEX NO.		
CLASSIFICATION NONE	BY NOT REQ'D	DRAWING NUMBER H-2-122134	SHEET 2	OF 3	REV. 1	

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DATE:

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MAY 18 1992

SAFETY CLASS 4 - (REF)

1	5/13/92	REVISED TITLE BLOCK PER CR #0724	KK	WF	WFO	WFO					
			EJ	AKY	WFO	WFO					
0	12/19/91	APPROVED FOR CONSTRUCTION	SC	BR	WFO	WFO					
			CCB	AKY	JGK	RNG					
REV NO.	DATE	REVISION DESCRIPTION	APPROVAL INITIALS								
CADFILE	B122134C		CADCODE	2B:IBM:ACD2:10.C2:SS							
ENGINEERING RELEASE		U.S. DEPARTMENT OF ENERGY Richland Operations Office DE - AC06-86RL10838.									
REV. _____ DATE _____ ERO. _____											
1	SIGNATURE		DATE								
	PROJ. DIR. R.N.GIBBONS		12-19-91								
	Q.A. ENGR. J.G.KELLY		12-12-91								
	INDEPENDENT SAFETY A.K.YEE		12-12-91								
	PROJECT PKG ENGINEER C.C.BUSCHMANN		12-12-91								
	ENGINEERING MGR. G.N.KIMURA		12-12-91								
	SUPERVISOR W.FRENCH K.A.OWREY		12-11-91								
DESIGN ENGINEER B.RETTIG		PROJECT TITLE HANFORD WASTE VITRIFICATION PLANT									
WING INDEX	CHECKED S.CLARK		PROJECT B-595		FLUOR CONTRACT NO. 8457		CWBS NO. A170				
	DRAWN M.KHOURI		SCALE NONE		BLDG. NO. ---		INDEX NO.				
CLASSIFICATION		BY		DRAWING NUMBER		SHEET		OF		REV.	
NONE		NOT REQ'D		H-2-122134		3		3		1	

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INITIALS:
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- D. POLE LOCATIONS ARE BASED ON BEST DESIGN AND CURRENTLY AVAILABLE "AS BUILT" SITE INFORMATION. FINAL POLE LOCATIONS SHALL BE DETERMINED AND/OR VERIFIED IN FIELD.
- E. CONTRACTOR SHALL REVISE PROFILE AS NECESSARY TO REFLECT ACTUAL SPAN LENGTHS AND SAGS PRIOR TO CONSTRUCTION, BASED ON ACTUAL STAKED POLE LOCATIONS.

MAY 18 1992

SAFETY CLASS 4 (REF)

0	5/13/92	APPROVED FOR CONSTRUCTION					
REV NO.	DATE	REVISION DESCRIPTION		APPROVAL INITIALS			
CADFILE	B122135A		CADCODE	2B:IBM:ACD2:10.C2:SS			
ENGINEERING RELEASE		U.S. DEPARTMENT OF ENERGY Richland Operations Office DE - AC06-86RL10838					
REV. _____ DATE _____							
ERO. _____		 FLUOR DANIEL, INC. ADVANCED TECHNOLOGY DIVISION					
SIGNATURE							
PROJ. OR		4/30/92		ELECTRICAL POLE LINE PROFILE			
QA. ENGR.		4/30/92					
INDEPENDENT SAFETY		4/28/92					
PROJECT PKG ENGINEER		4/28/92					
ENGINEERING MGR.		4/28/92					
SUPERVISOR		4/27/92					
DESIGN ENGINEER		PROJECT TITLE HANFORD WASTE VITRIFICATION PLANT					
CHECKED		4/27/92		PROJECT B-595		FLUOR CONTRACT NO. 8457	
DRAWN		R. WARREN		SCALE NOTED		BLDG. NO. ---	
CLASSIFICATION		BY		DRAWING NUMBER		SHEET	
NONE		NOT REQ'D		H-2-122135		1	
						OF	
						REV.	
						0	

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SAFETY CLASS 4 (REF)

0	5/13/92	APPROVED FOR CONSTRUCTION				
REV NO.	DATE	REVISION DESCRIPTION	APPROVAL INITIALS			
CADFILE	B122135B		CADCODE	2B:IBM:ACD2:10.C2:SS		
ENGINEERING RELEASE		U.S. DEPARTMENT OF ENERGY Richland Operations Office DE - AC06-86RL10838				
REV. _____ DATE _____ ERO. _____						
SIGNATURE		DATE	 FLUOR DANIEL, INC. ADVANCED TECHNOLOGY DIVISION			
PROJ. DIR.		4/30/92				
Q.A. ENGR.		4/30/92				
INDEPENDENT SAFETY		4/28/92				
PROJECT PKG ENGINEER		4-28-92				
ENGINEERING MGR.		4/28/92				
SUPERVISOR		4-27-92	ELECTRICAL POLE LINE PROFILE			
DESIGN ENGINEER		4/27/92				
CHECKED		4/27/92				
DRAWN			PROJECT TITLE HANFORD WASTE VITRIFICATION PLANT			
R. WARREN			PROJECT	FLUOR CONTRACT NO.	CWBS NO.	
			B-595	8457	A170	
			SCALE	BLDG. NO.	INDEX NO.	
			NOTED	---		
CLASSIFICATION	BY	DRAWING NUMBER	SHEET	OF	REV.	
NONE	NOT REQ'D	H-2-122135	2	2	0	

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SAFETY CLASS 4 (REF)

1	5/13/92	REVD TITLE BLOCK & SPECIFICATION	REM	CD	RPK	SAR
		NUMBERS	EL	AKY	RPK	RPK
0	12/19/91	APPROVED FOR CONSTRUCTION	JG	JR	JH	GK
			CCB	MJH	JGK	RNG
REV NO.	DATE	REVISION DESCRIPTION	APPROVAL INITIALS			
CADFILE	B118060A		CADCODE	2B:IBM:ACD2:10.C2:SS		
ENGINEERING RELEASE		U.S. DEPARTMENT OF ENERGY Richland Operations Office DE - AC06-86RL10838				
REV. _____ DATE _____						
ERO. _____		 FLUOR DANIEL, INC. ADVANCED TECHNOLOGY DIVISION				
SIGNATURE						
DATE		STRUCTURAL NOTES AND TYPICAL DETAILS				
PROJ. DIR.						
R.N. GIBBONS						
Q.A. ENGR.						
J.G. KELLY						
INDEPENDENT SAFETY						
M.J. HIGUERA						
PROJECT PKG ENGINEER						
C.C. BUSCHMANN						
ENGINEERING MGR.						
G.N. KIMURA		HANFORD WASTE VITRIFICATION PLANT				
SUPERVISOR						
R.P. KUMAR						
DESIGN ENGINEER						
J.C. HSI		PROJECT TITLE HANFORD WASTE VITRIFICATION PLANT				
CHECKED						
J.R. REA		PROJECT		FLUOR CONTRACT NO.		CWBS NO.
12/16/91		B-595		8457		A170
DRAWN		SCALE		BLDG. NO.		INDEX NO.
J.A. GOODE		NONE				
12/13/91						
CLASSIFICATION		BY		DRAWING NUMBER		SHEET
NONE		NOT REQ'D		H-2-118060		1
						OF
						REV.
						1

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SAFETY CLASS 4 (REF)

1	5/13/92	REVD TITLE BLOCK & REFERENCE	REM	CB	RPK	gnc	
		DRAWING BLOCK	ED	AKY	SAK	DDP	
0	12/19/91	APPROVED FOR CONSTRUCTION	JG	JR	JH RPK	GK	
			CCB	MJH	JGK	RNG	
REV NO.	DATE	REVISION DESCRIPTION	APPROVAL INITIALS				
CADFILE	B118061A		CADCODE	2B:IBM:ACD2:10.C2:SS			
ENGINEERING RELEASE			U.S. DEPARTMENT OF ENERGY Richland Operations Office DE - AC06-86RL10838				
REV. _____ DATE _____ ERO. _____							
SIGNATURE		DATE	 FLUOR DANIEL, INC. ADVANCED TECHNOLOGY DIVISION				
PROJ. DIR. R.N. GIBBONS		12/19/91					
Q.A. ENGR. J.G. KELLY		12/19/91					
INDEPENDENT SAFETY M.J. HIGUERA		12/19/91					
PROJECT PKG ENGINEER C.C. BUSCHMANN		12/19/91					
ENGINEERING MGR. G.N. KIMURA		12/19/91					
SUPERVISOR R.P. KUMAR		12/16/91	STRUCTURAL SG-32T-001 SWITCHGEAR FOUNDATION DETAILS				
DESIGN ENGINEER J.C. HSI		12/16/91					
CHECKED J.R. REA		12/16/91					
DRAWN J.A. GOODE		12/13/91					
CLASSIFICATION		BY	DRAWING NUMBER		SHEET	OF	REV.
NONE		NOT REQ'D	H-2-118061		1	1	1

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SAFETY CLASS 4 (REF)

1	5/13/92	REVD TITLE BLOCK, REF DWG BLOCK & W COORD AT SB-327-004	REM	CP	RPK	RCR
0	12/19/91	APPROVED FOR CONSTRUCTION	EJ	AKY	WHP	PP
			JG	JR	JH	GK
			CCB	MJH	JGK	RNG
REV NO.	DATE	REVISION DESCRIPTION	APPROVAL INITIALS			
CADFILE	B118062A		CADCODE	2B:IBM:ACD2:10.C2:SS		
ENGINEERING RELEASE			U.S. DEPARTMENT OF ENERGY Richland Operations Office DE - AC06-86RL10838			
REV. _____ DATE _____ ERO. _____						
SIGNATURE		DATE	 FLUOR DANIEL, INC. ADVANCED TECHNOLOGY DIVISION STRUCTURAL ELECTRICAL EQUIPMENT FOUNDATION DETAILS			
PROJ. DIR. R.N. GIBBONS		12/19/91				
Q.A. ENGR. J.G. KELLY		12/19/91				
INDEPENDENT SAFETY M.J. HIGUERA		12/19/91				
PROJECT PKG ENGINEER C.C. BUSCHMANN		12/19/91				
ENGINEERING MGR. G.N. KIMURA		12/19/91				
SUPERVISOR R.P. KUMAR		12/16/91				
DESIGN ENGINEER J.C. HSI		12/16/91	PROJECT TITLE HANFORD WASTE VITRIFICATION PLANT			
CHECKED J.R. REA		12/16/91	PROJECT B-595	FLUOR CONTRACT NO. 8457	CWBS NO. A170	
DRAWN J.A. GOODE		12/13/91	SCALE SHOWN	BLDG. NO.	INDEX NO.	
CLASSIFICATION	BY	DRAWING NUMBER	SHEET	OF	REV.	
NONE	NOT REQ'D	H-2-118062	1	1	1	

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SAFETY CLASS 4 (REF)

1	5/13/92	REVD TITLE BLOCK & REFERENCE	REM	CB	RPK	SNK
		DRAWING BLOCK	EJ	AKY	PK	LP
0	12/19/91	APPROVED FOR CONSTRUCTION	JG	JR	JH	GK
			CCB	MJH	JGK	RNG
REV NO.	DATE	REVISION DESCRIPTION	APPROVAL INITIALS			
CADFILE	B118063A		CADCODE	2B:IBM:ACD2:10.C2:SS		
ENGINEERING RELEASE			U.S. DEPARTMENT OF ENERGY Richland Operations Office DE - AC06-86RL10838			
REV. _____ DATE _____ ERO. _____						
SIGNATURE		DATE	 FLUOR DANIEL, INC. ADVANCED TECHNOLOGY DIVISION			
PROJ. DIR. R.N. GIBBONS		12/19/91				
Q.A. ENGR. J.G. KELLY		12/19/91	STRUCTURAL TEL CONSOLE & LIGHT POLE FOUNDATION DETAILS			
INDEPENDENT SAFETY M.J. HIGUERA		12/19/91				
PROJECT PKG ENGINEER C.C. BUSCHMANN		12/19/91				
ENGINEERING MGR. G.N. KIMURA		12/19/91				
SUPERVISOR R.P. KUMAR		12/16/91				
DESIGN ENGINEER J.C. HSI		12/16/91	PROJECT TITLE HANFORD WASTE VITRIFICATION PLANT			
DRAWING INDEX	CHECKED J.R. REA	12/16/91	PROJECT B-595	FLUOR CONTRACT NO. 8457	CWBS NO. A170	
	DRAWN J.A. GOODE	12/16/91	SCALE 3/4" = 1'-0"	BLDG. NO.	INDEX NO.	
	CLASSIFICATION NONE	BY NOT REQ'D	DRAWING NUMBER H-2-118063		SHEET 1	OF 1

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